FIG. 1

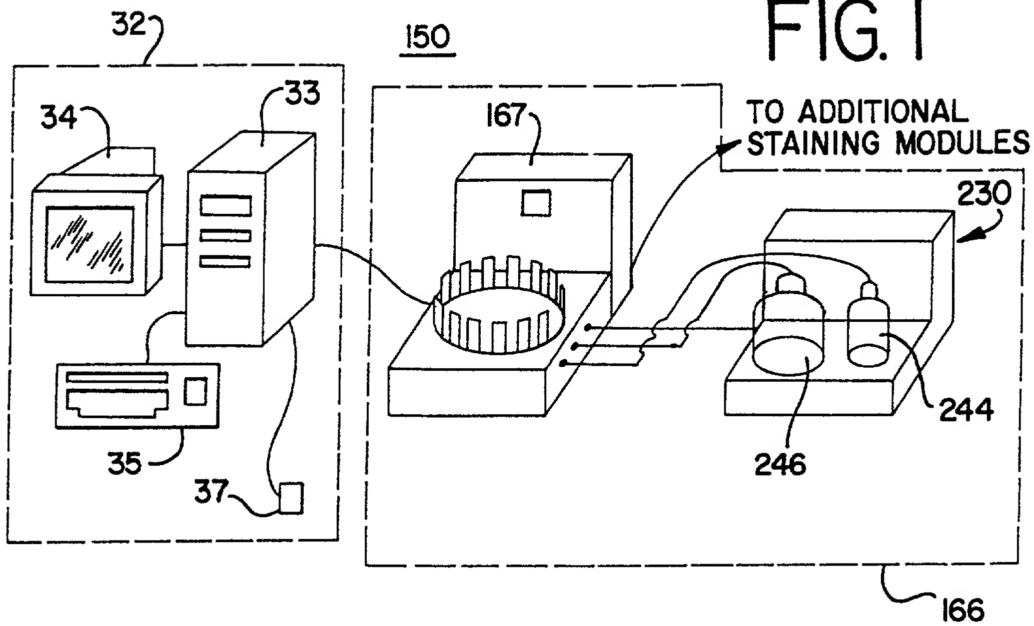
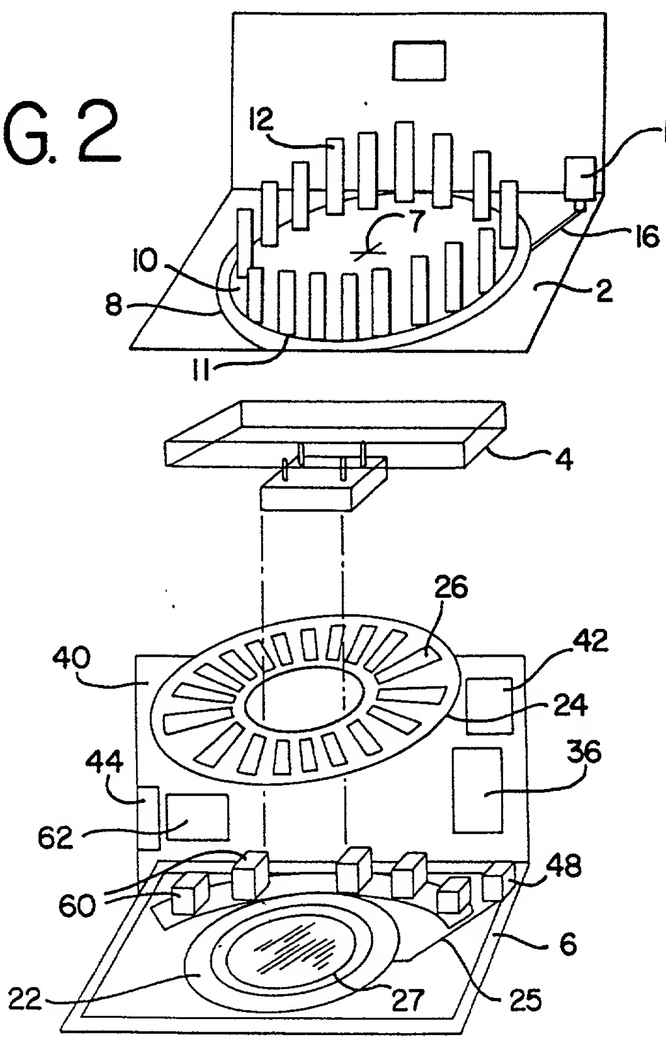


FIG. 2



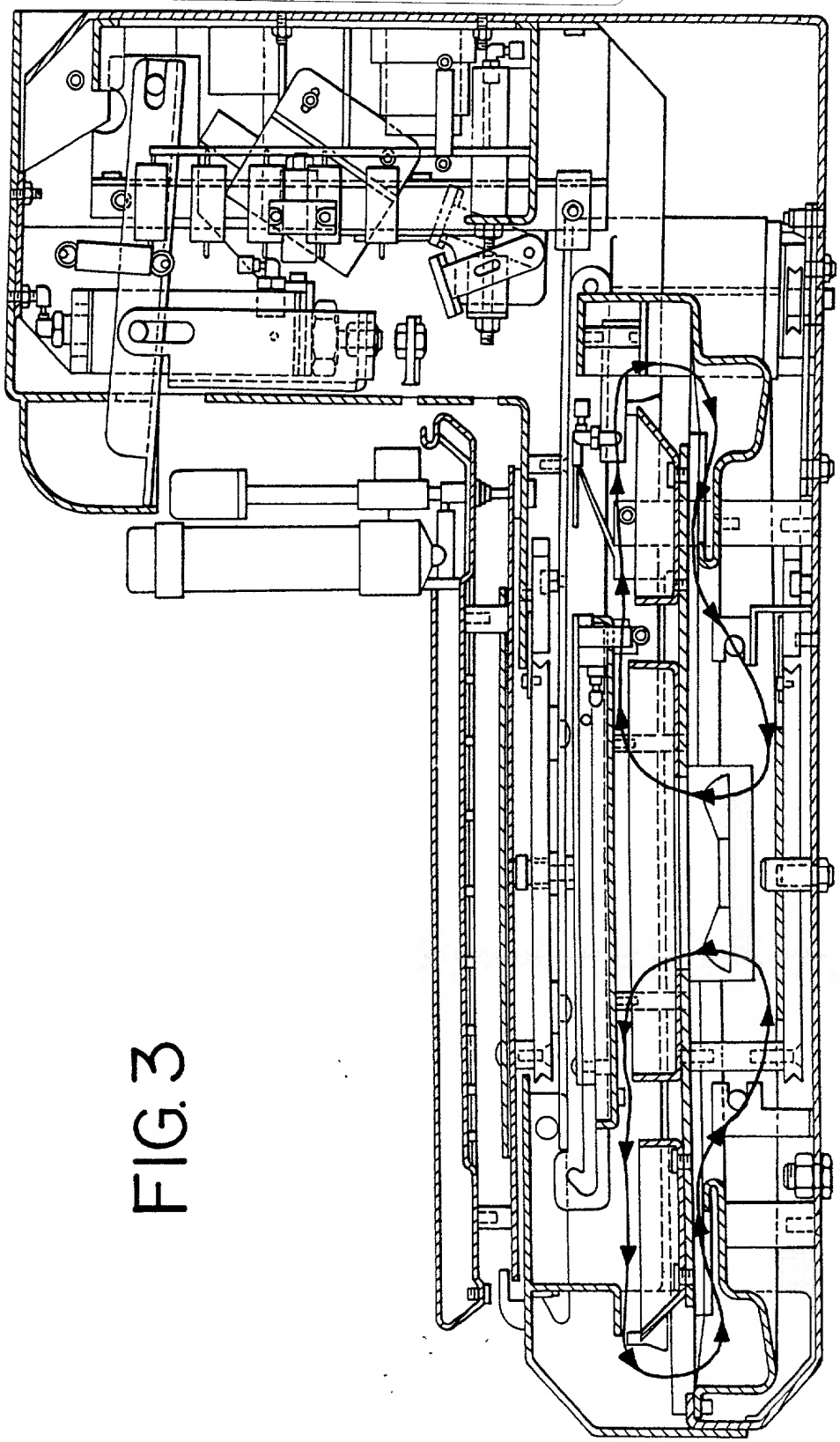
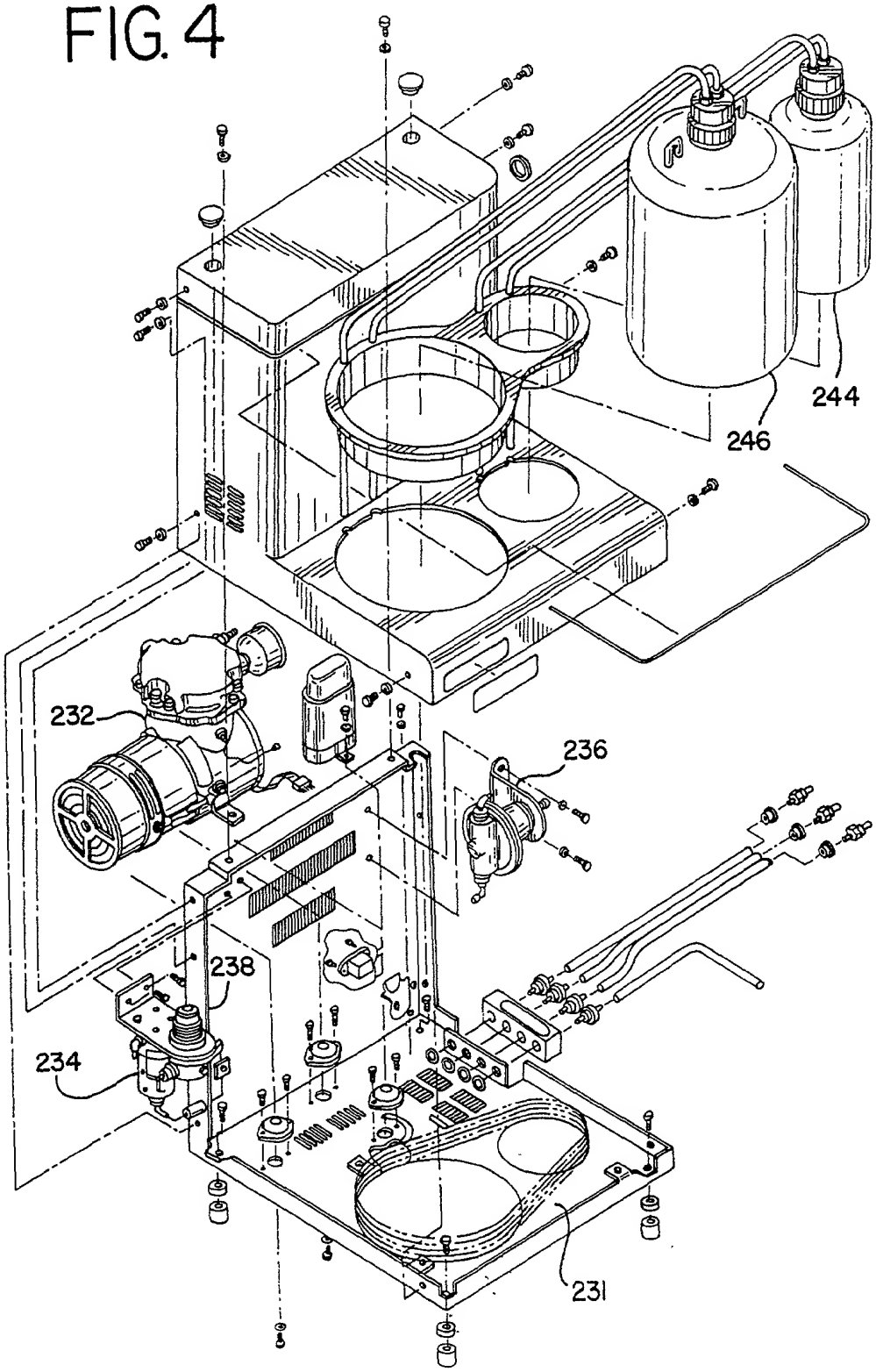


FIG. 3

FIG. 4



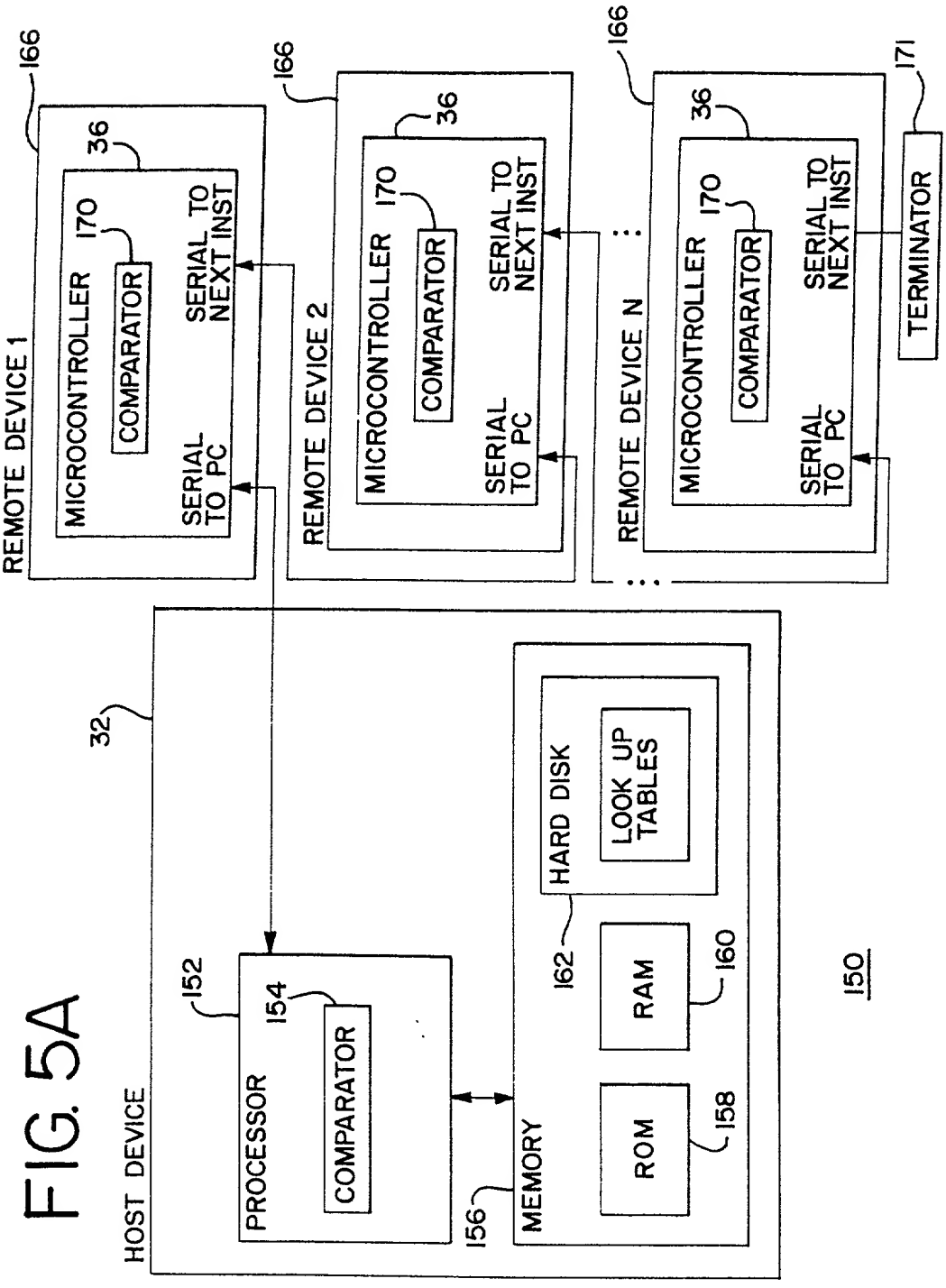
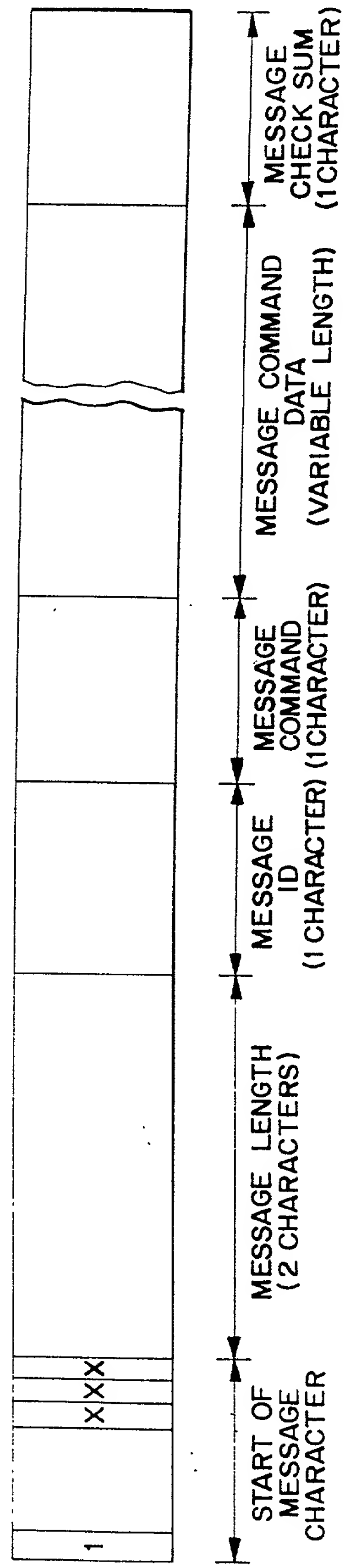

HOST DEVICE
32
PROCESSOR
152
154
COMPARATOR
156
MEMORY
ROM
158
RAM
160
HARD DISK
162
LOOK UP TABLES
150
REMOTE DEVICE 1
166
MICROCONTROLLER
36
170
COMPARATOR
SERIAL TO NEXT INST
SERIAL TO PC
REMOTE DEVICE 2
REMOTE DEVICE N
TERMINATOR
171

FIG. 5A

FIG. 5B


1
XXX
START OF MESSAGE CHARACTER
MESSAGE LENGTH (2 CHARACTERS)
MESSAGE ID (1 CHARACTER)
MESSAGE COMMAND (1CHARACTER)
MESSAGE COMMAND DATA (VARIABLE LENGTH)
MESSAGE CHECK SUM (1CHARACTER)

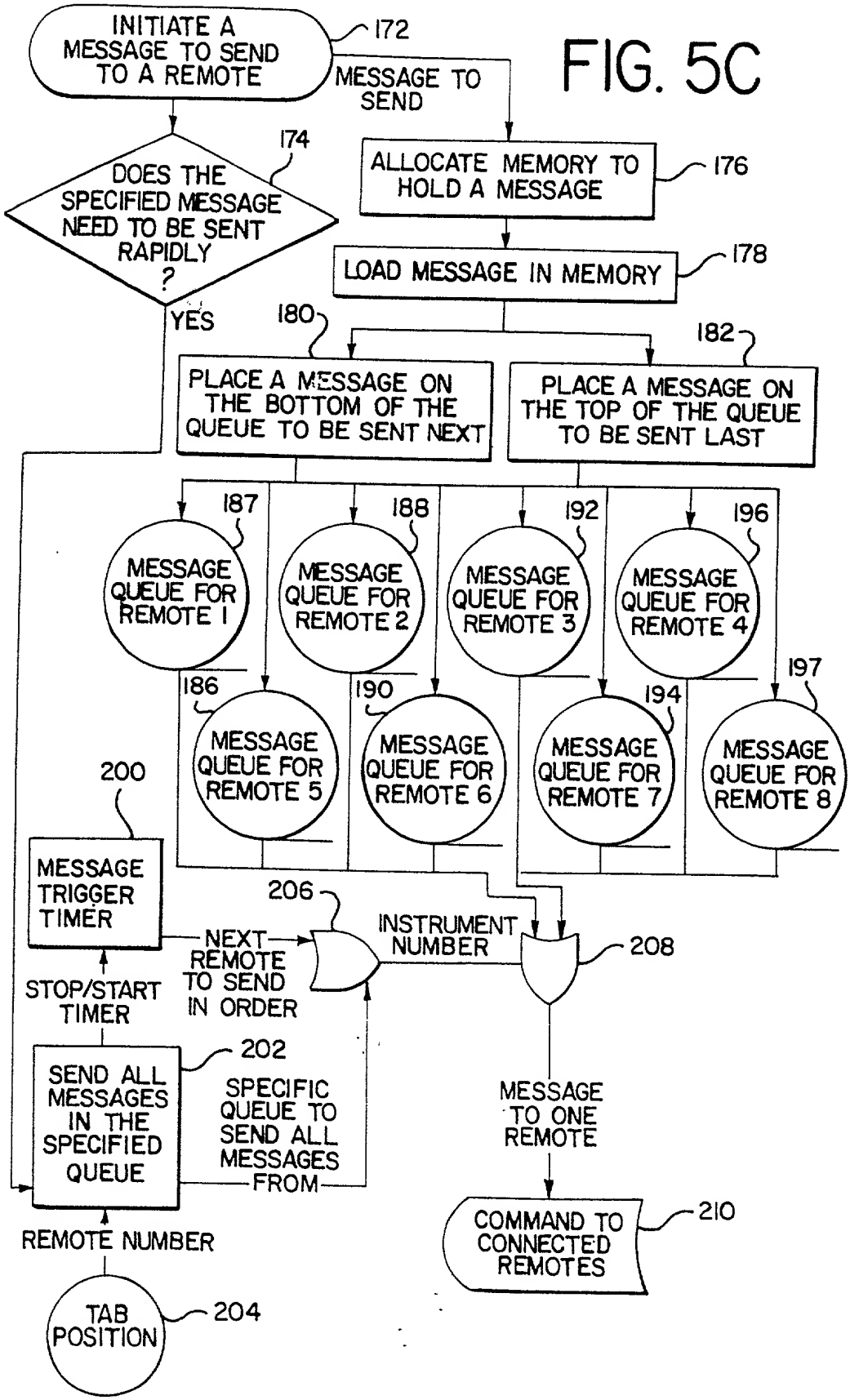

INITIATE A MESSAGE TO SEND TO A REMOTE
172
MESSAGE TO SEND
DOES THE SPECIFIED MESSAGE NEED TO BE SENT RAPIDLY ?
174
YES
ALLOCATE MEMORY TO HOLD A MESSAGE
176
LOAD MESSAGE IN MEMORY
178
180
PLACE A MESSAGE ON THE BOTTOM OF THE QUEUE TO BE SENT NEXT
182
PLACE A MESSAGE ON THE TOP OF THE QUEUE TO BE SENT LAST
187
MESSAGE QUEUE FOR REMOTE 1
188
MESSAGE QUEUE FOR REMOTE 2
192
MESSAGE QUEUE FOR REMOTE 3
196
MESSAGE QUEUE FOR REMOTE 4
186
MESSAGE QUEUE FOR REMOTE 5
190
MESSAGE QUEUE FOR REMOTE 6
194
MESSAGE QUEUE FOR REMOTE 7
197
MESSAGE QUEUE FOR REMOTE 8
200
MESSAGE TRIGGER TIMER
206
NEXT REMOTE TO SEND IN ORDER
INSTRUMENT NUMBER
208
STOP/START TIMER
202
SEND ALL MESSAGES IN THE SPECIFIED QUEUE
SPECIFIC QUEUE TO SEND ALL MESSAGES FROM
MESSAGE TO ONE REMOTE
REMOTE NUMBER
TAB POSITION
204
COMMAND TO CONNECTED REMOTES
210

FIG. 5C

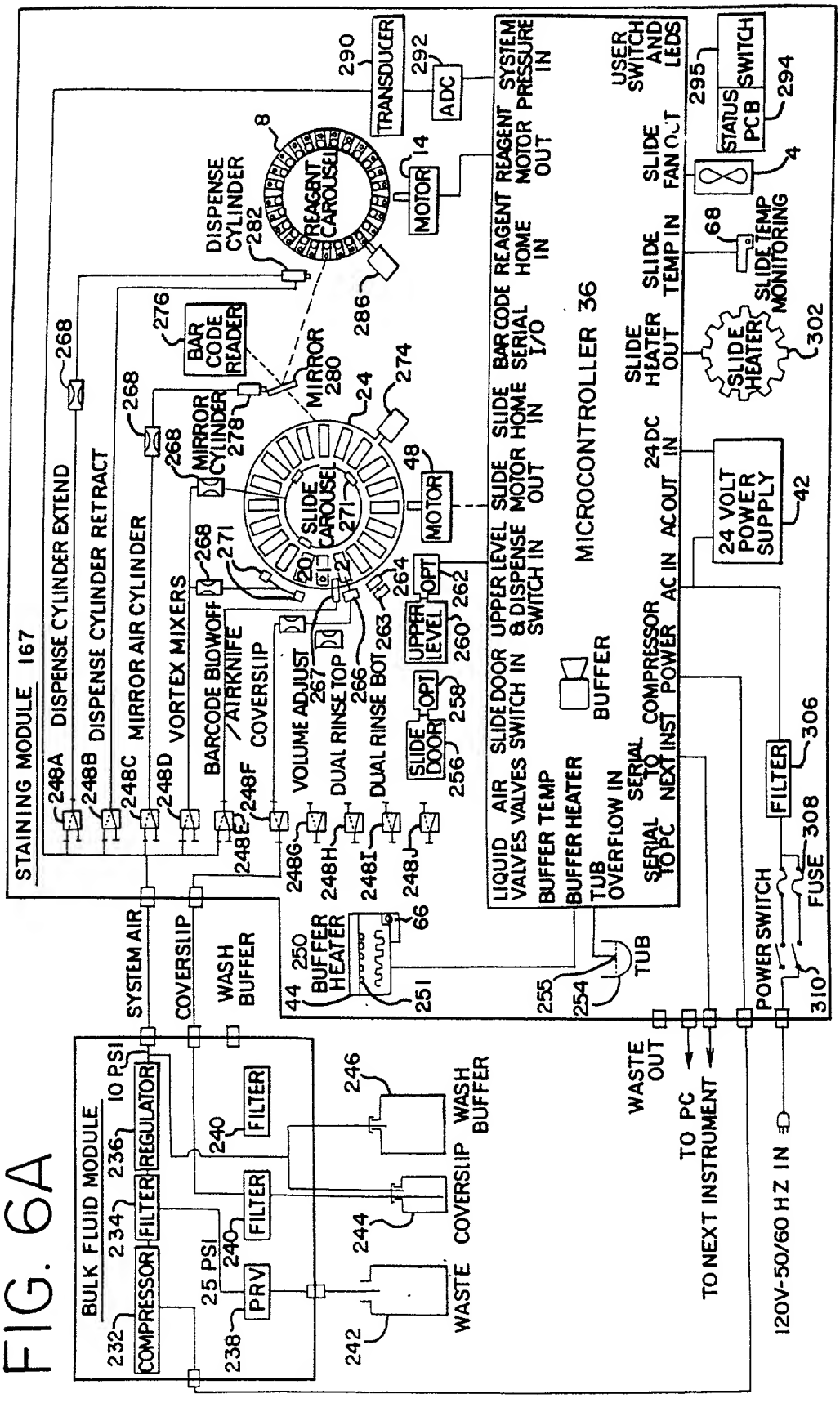

STAINING MODULE 167
248A DISPENSE CYLINDER EXTEND
248B DISPENSE CYLINDER RETRACT
248C MIRROR AIR CYLINDER
248D VORTEX MIXERS
248E BARCODE BLOWOFF
248F AIRKNIFE
248G VOLUME ADJUST
248H DUAL RINSE TOP
248I DUAL RINSE BOT
248J SLIDE DOOR
MICROCONTROLLER 36
LIQUID AIR VALVES
SLIDE DOOR SWITCH IN
UPPER LEVEL & DISPENSE SWITCH IN
SLIDE MOTOR OUT
SLIDE HOME IN
BAR CODE SERIAL I/O
REAGENT MOTOR OUT
REAGENT HOME IN
SYSTEM PRESSURE IN
BUFFER TEMP
BUFFER HEATER
TUB OVERFLOW IN
SERIAL TO PC
SERIAL TO NEXT INST
COMPRESSOR POWER
AC IN
AC OUT
24DC IN
SLIDE HEATER OUT
SLIDE TEMP IN
USER SWITCH AND LEDS
SYSTEM AIR
COVERSLIP
WASH BUFFER
BUFFER HEATER
TUB
WASTE OUT
TO PC
TO NEXT INSTRUMENT
120V-50/60 HZ IN
POWER SWITCH
FUSE
FILTER
24 VOLT POWER SUPPLY
SLIDE HEATER
SLIDE TEMP MONITORING
SLIDE FAN OUT
STATUS PCB
SWITCH
TRANSDUCER
ADC
MOTOR
DISPENSE CYLINDER
REAGENT CAROUSEL
MIRROR
MIRROR CYLINDER
BAR CODE READER
SLIDE CAROUSEL
MOTOR
UPPER LEVEL OPT
SLIDE DOOR OPT
VOLUME ADJUST
DUAL RINSE TOP
DUAL RINSE BOT
BARCODE BLOWOFF
AIRKNIFE
COVERSLIP
VORTEX MIXERS
MIRROR AIR CYLINDER
DISPENSE CYLINDER RETRACT
DISPENSE CYLINDER EXTEND
BULK FLUID MODULE
COMPRESSOR
FILTER
REGULATOR
10 PSI
25 PSI
PRV
FILTER
FILTER
WASTE
COVERSLIP
WASH BUFFER
SYSTEM AIR
COVERSLIP
WASH BUFFER
BUFFER HEATER
TUB
WASTE OUT
TO PC
TO NEXT INSTRUMENT
120V-50/60 HZ IN
POWER SWITCH
FUSE
FILTER
24 VOLT POWER SUPPLY
SLIDE HEATER
SLIDE TEMP MONITORING
SLIDE FAN OUT
STATUS PCB
SWITCH
TRANSDUCER
ADC
MOTOR
DISPENSE CYLINDER
REAGENT CAROUSEL
MIRROR
MIRROR CYLINDER
BAR CODE READER
SLIDE CAROUSEL
MOTOR
UPPER LEVEL OPT
SLIDE DOOR OPT
VOLUME ADJUST
DUAL RINSE TOP
DUAL RINSE BOT
BARCODE BLOWOFF
AIRKNIFE
COVERSLIP
VORTEX MIXERS
MIRROR AIR CYLINDER
DISPENSE CYLINDER RETRACT
DISPENSE CYLINDER EXTEND

FIG. 6A

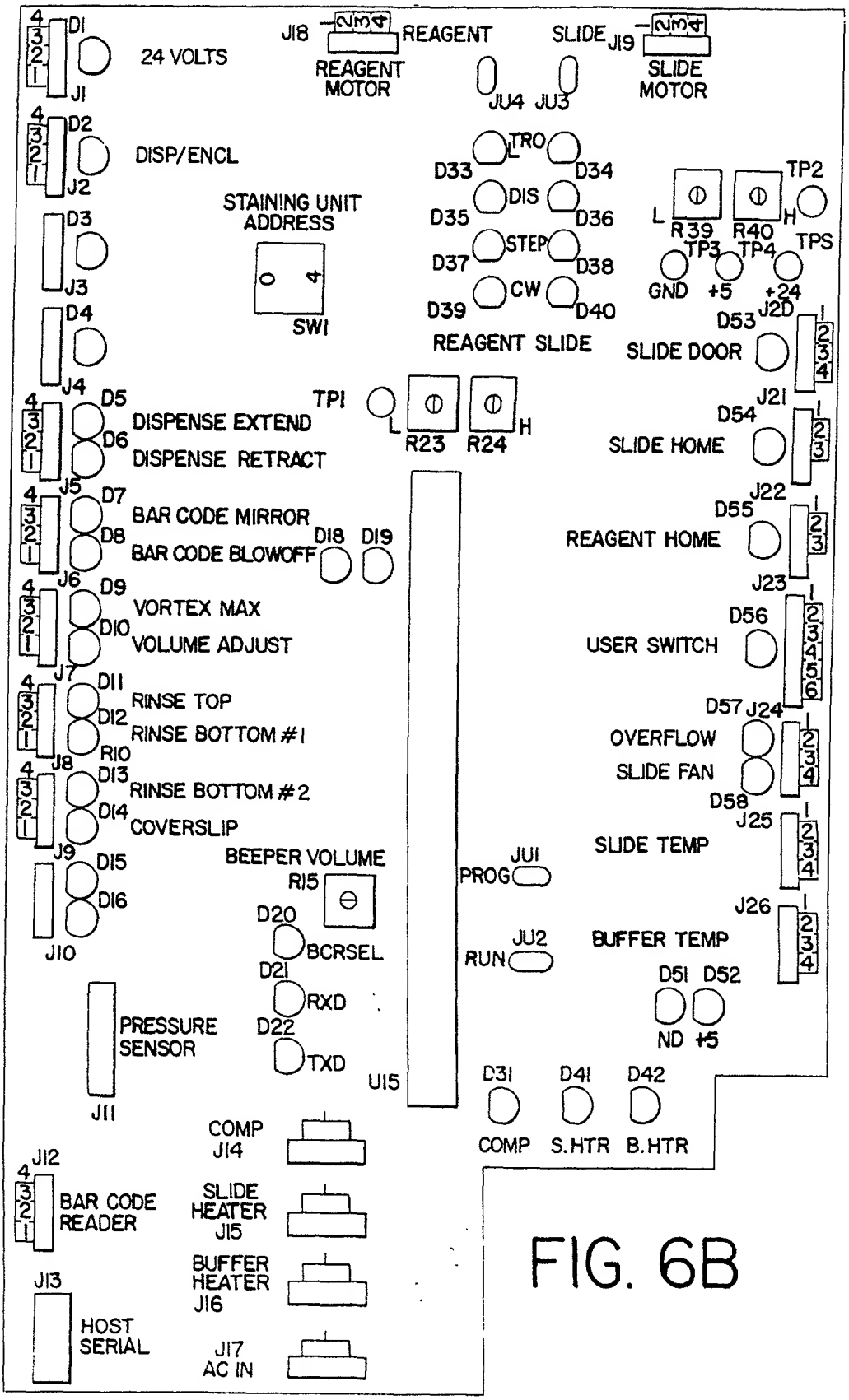

D1
24 VOLTS
J1
J18
REAGENT
REAGENT MOTOR
SLIDE
J19
SLIDE MOTOR
JU4 JU3
D2
DISP/ENCL
J2
D33
TRO
D34
D35
DIS
D36
D37
STEP
D38
D39
CW
D40
TP2
L
R39
R40
H
TP3
TP4
TP5
GND
+5
+24
STAINING UNIT ADDRESS
SW1
D3
J3
D4
J4
REAGENT SLIDE
J20
D53
SLIDE DOOR
TP1
R23
R24
D5
DISPENSE EXTEND
D6
DISPENSE RETRACT
J21
D54
SLIDE HOME
J5
D7
BAR CODE MIRROR
D8
BAR CODE BLOWOFF
D18
D19
J22
D55
REAGENT HOME
J6
D9
VORTEX MAX
D10
VOLUME ADJUST
J23
D56
USER SWITCH
J7
D11
RINSE TOP
D12
RINSE BOTTOM #1
R10
D57
J24
OVERFLOW
SLIDE FAN
D58
J8
D13
RINSE BOTTOM #2
D14
COVERSLIP
J25
SLIDE TEMP
J9
D15
D16
BEEPER VOLUME
R15
D20
BCRSEL
D21
RXD
D22
TXD
JU1
PROG
JU2
RUN
J26
BUFFER TEMP
D51
D52
ND
+5
J10
PRESSURE SENSOR
J11
U15
D31
D41
D42
COMP
S.HTR
B.HTR
COMP J14
SLIDE HEATER J15
BUFFER HEATER J16
J17 AC IN
J12
BAR CODE READER
J13
HOST SERIAL

FIG. 6B

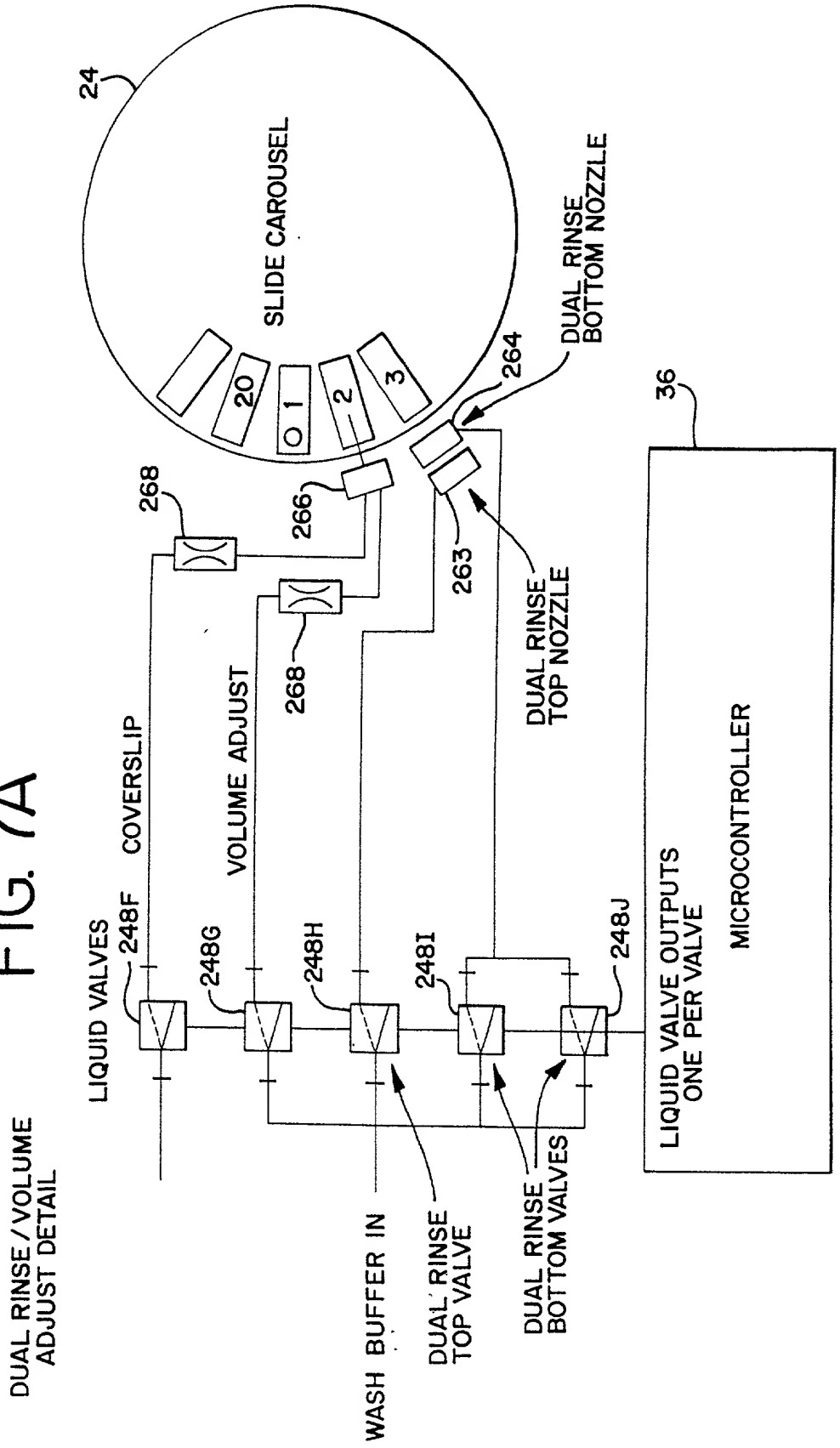


FIG. 7A

DUAL RINSE / VOLUME
ADJUST DETAIL

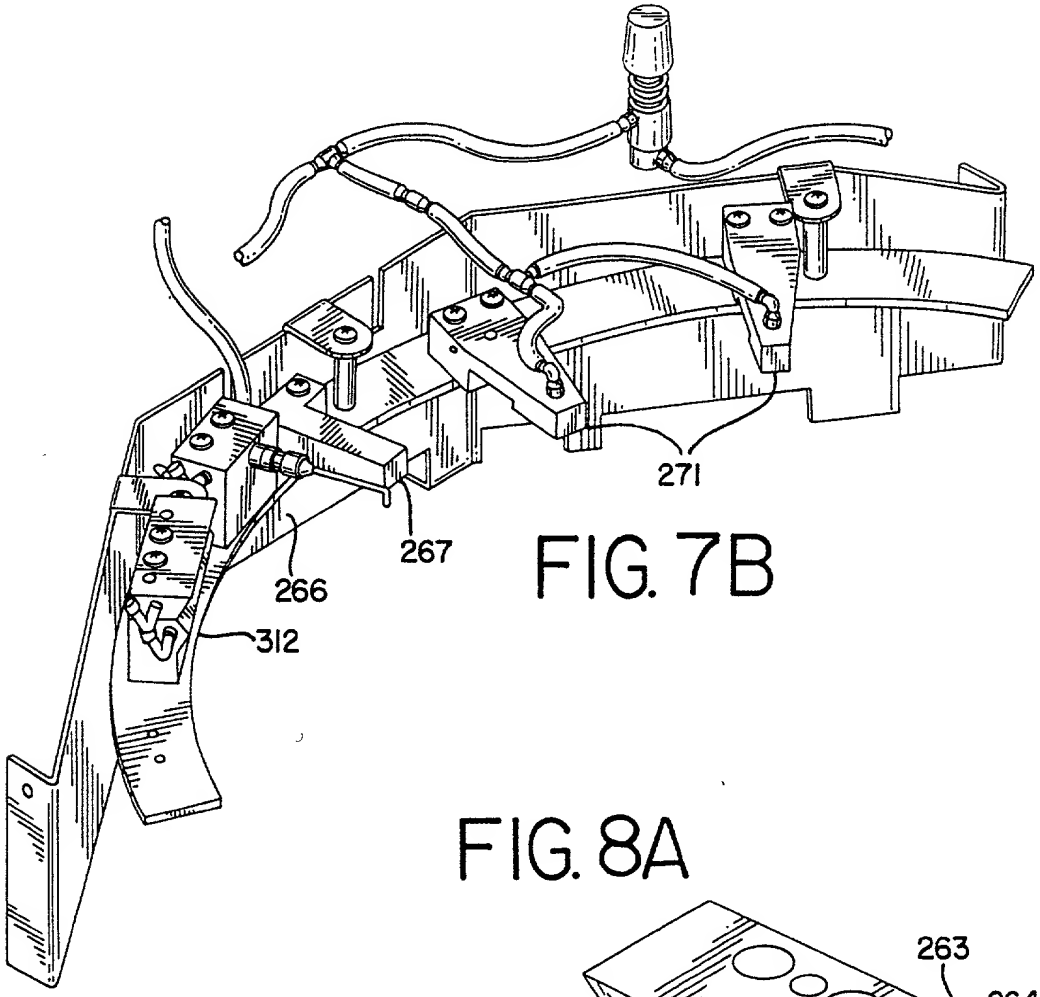
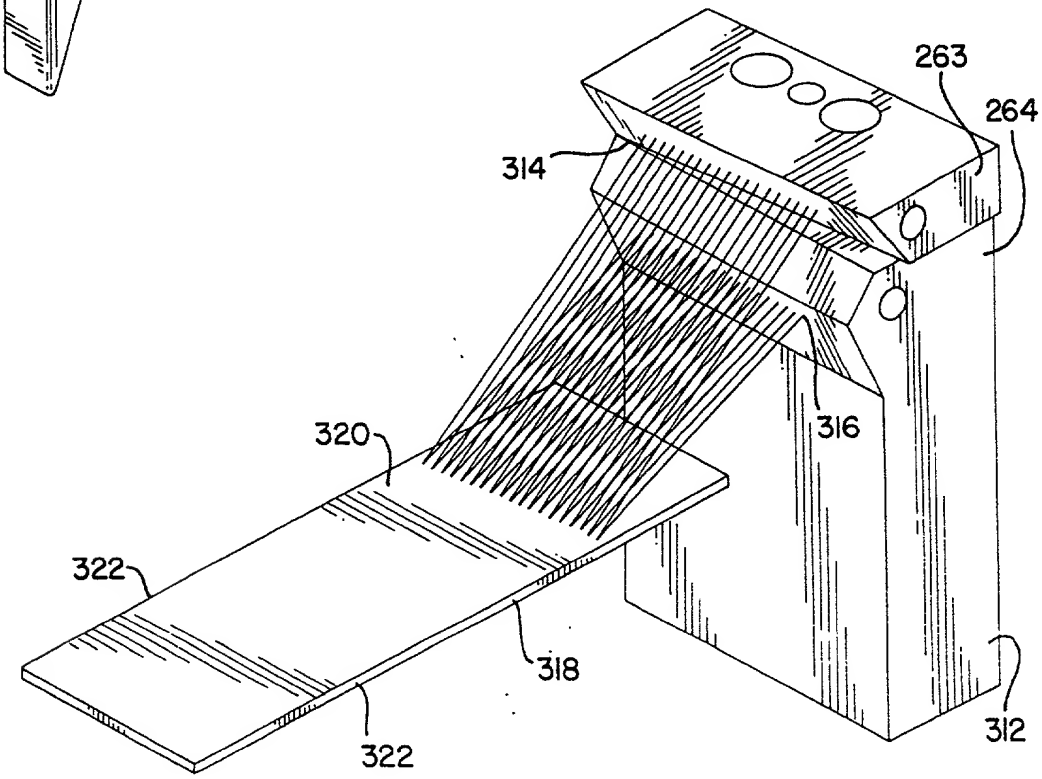


FIG. 7B

FIG. 8A



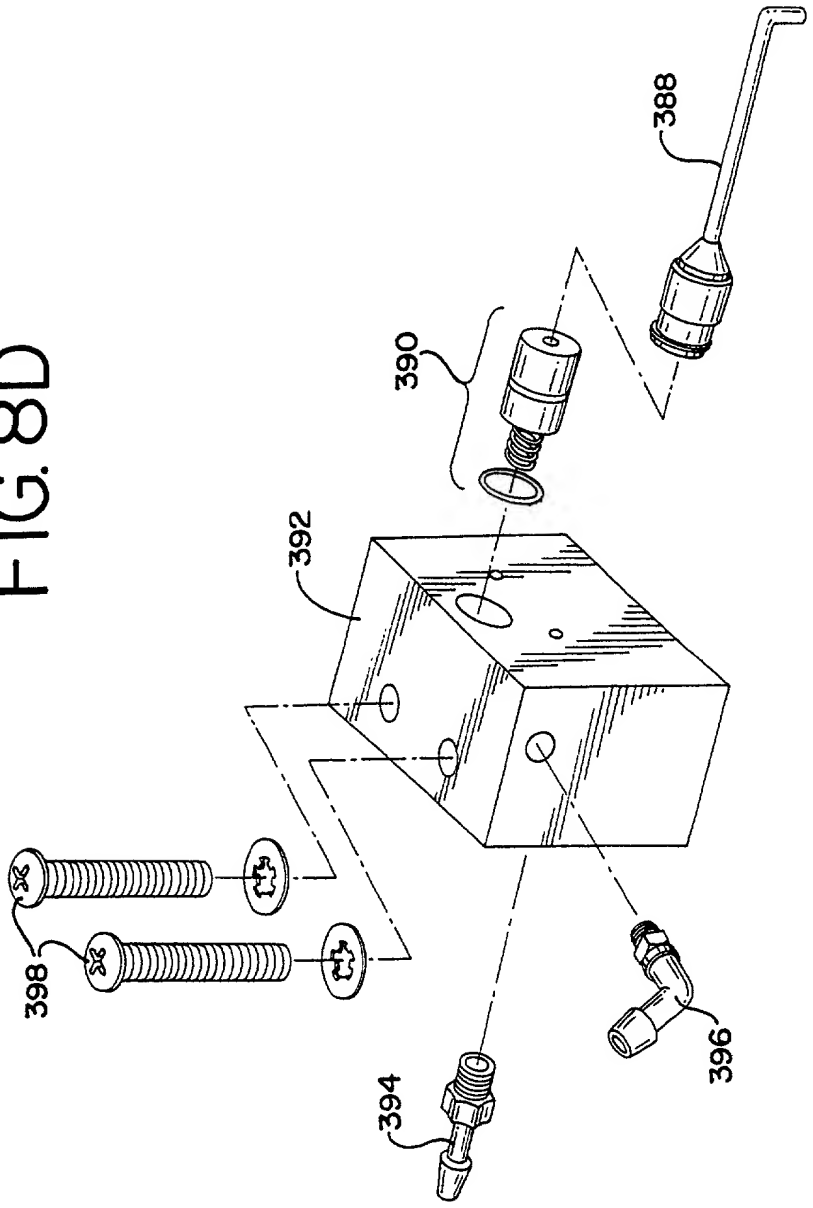


FIG. 8D

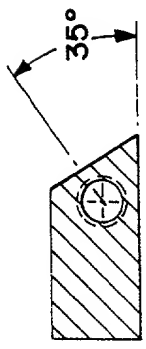


FIG. 8B

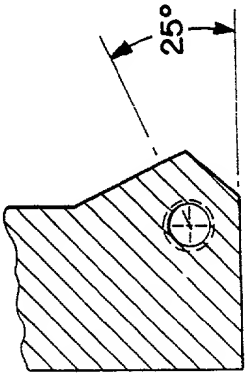


FIG. 8C

FIG. 9A

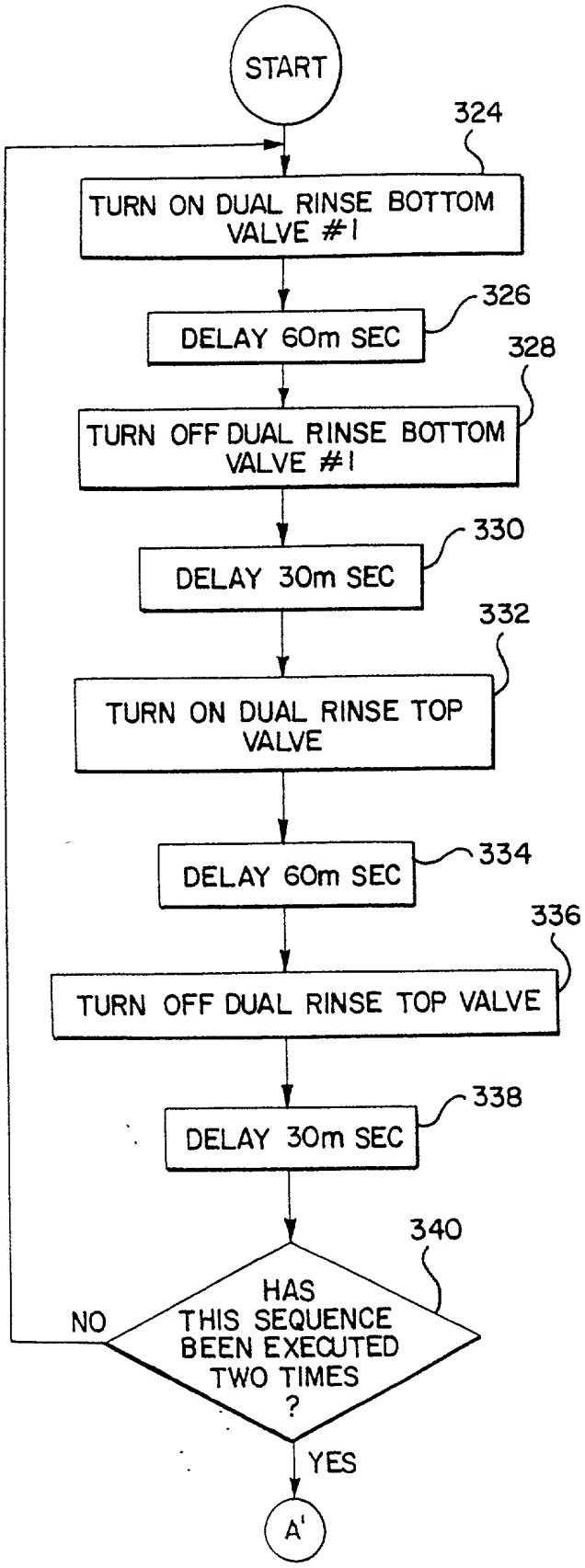

START
324
TURN ON DUAL RINSE BOTTOM VALVE #1
326
DELAY 60m SEC
328
TURN OFF DUAL RINSE BOTTOM VALVE #1
330
DELAY 30m SEC
332
TURN ON DUAL RINSE TOP VALVE
334
DELAY 60m SEC
336
TURN OFF DUAL RINSE TOP VALVE
338
DELAY 30m SEC
340
HAS THIS SEQUENCE BEEN EXECUTED TWO TIMES ?
NO
YES
A'

FIG. 9B

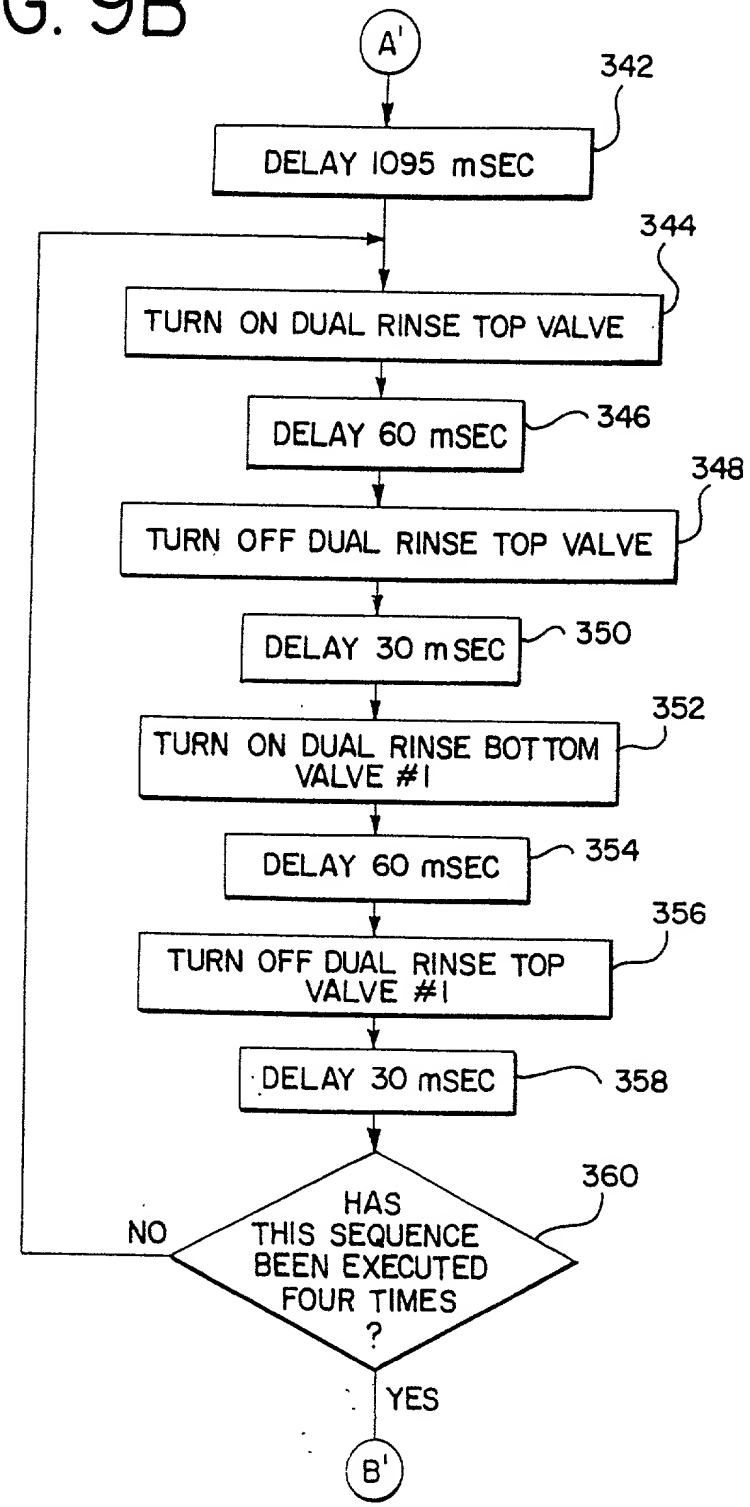

A'
342
DELAY 1095 mSEC
344
TURN ON DUAL RINSE TOP VALVE
DELAY 60 mSEC
346
348
TURN OFF DUAL RINSE TOP VALVE
DELAY 30 mSEC
350
352
TURN ON DUAL RINSE BOTTOM VALVE #1
DELAY 60 mSEC
354
356
TURN OFF DUAL RINSE TOP VALVE #1
DELAY 30 mSEC
358
360
HAS THIS SEQUENCE BEEN EXECUTED FOUR TIMES ?
NO
YES
B'

FIG. 9C

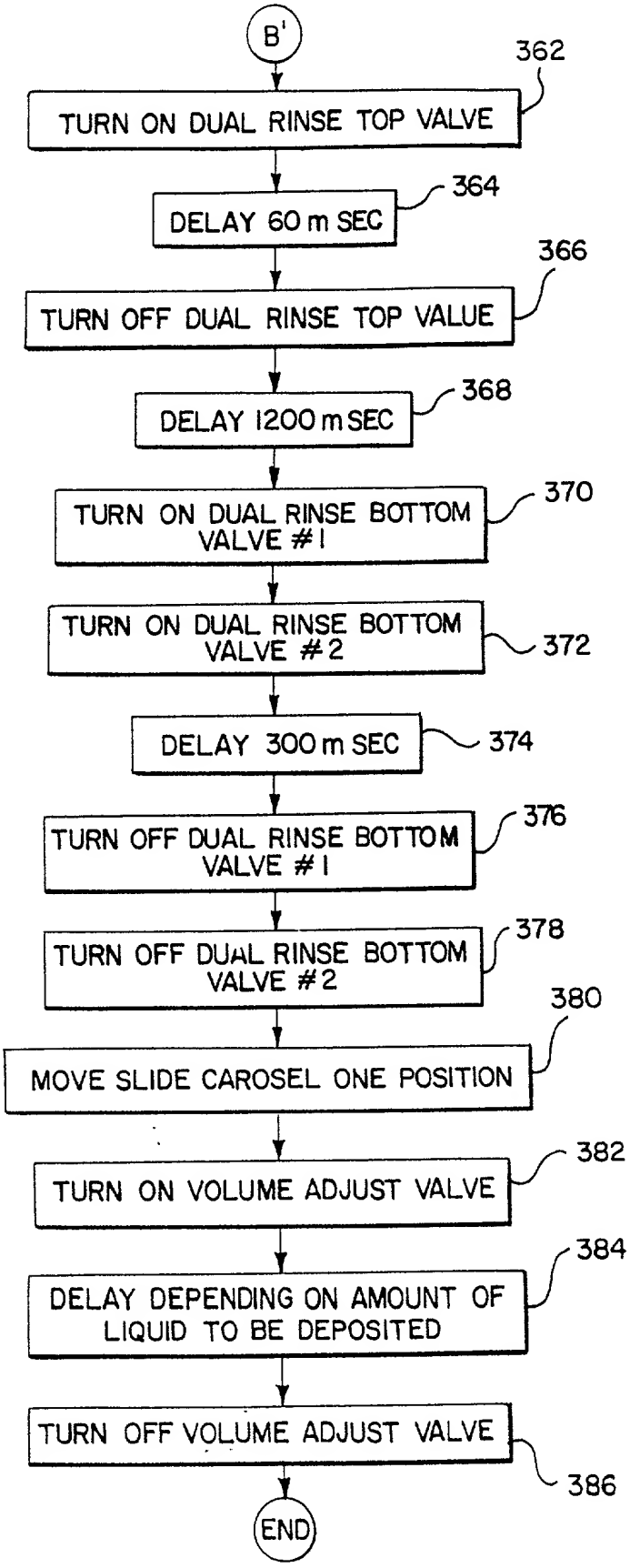

B'
362
TURN ON DUAL RINSE TOP VALVE
364
DELAY 60 m SEC
366
TURN OFF DUAL RINSE TOP VALUE
368
DELAY 1200 m SEC
370
TURN ON DUAL RINSE BOTTOM VALVE #1
372
TURN ON DUAL RINSE BOTTOM VALVE #2
374
DELAY 300 m SEC
376
TURN OFF DUAL RINSE BOTTOM VALVE #1
378
TURN OFF DUAL RINSE BOTTOM VALVE #2
380
MOVE SLIDE CAROSEL ONE POSITION
382
TURN ON VOLUME ADJUST VALVE
384
DELAY DEPENDING ON AMOUNT OF LIQUID TO BE DEPOSITED
TURN OFF VOLUME ADJUST VALVE
386
END

FIG. 10

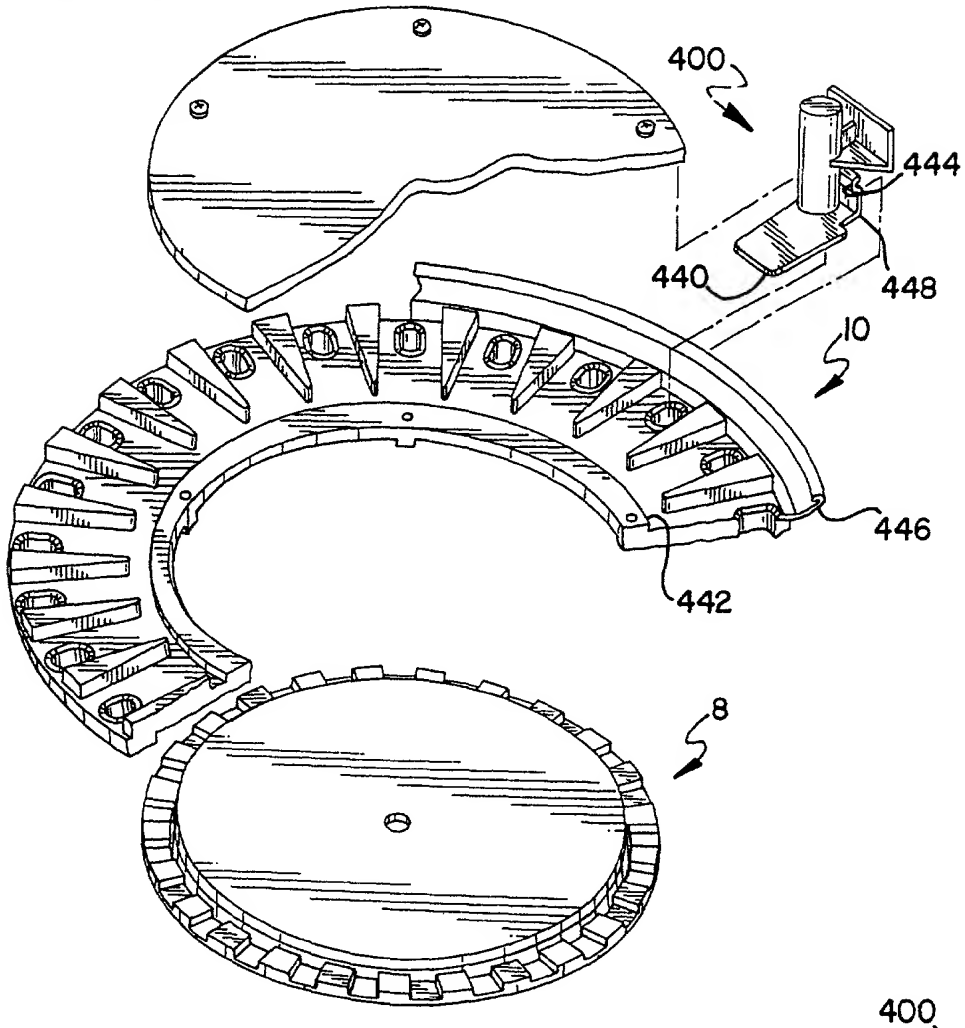


FIG. 11

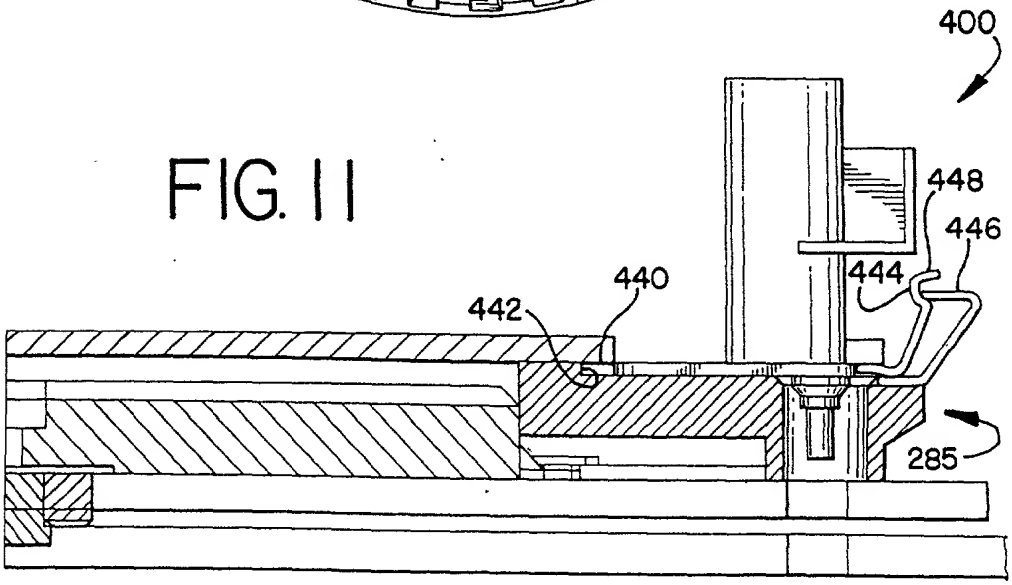


FIG. 12A

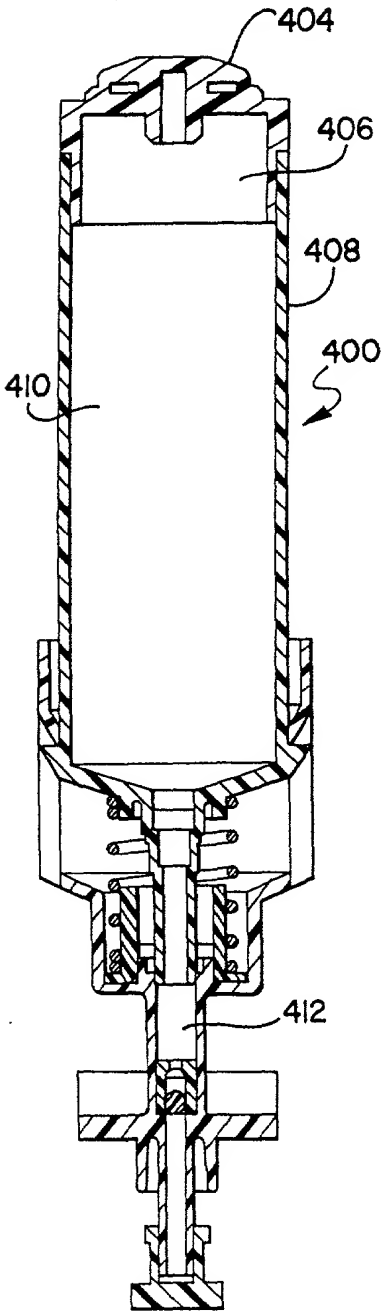


FIG. 12B

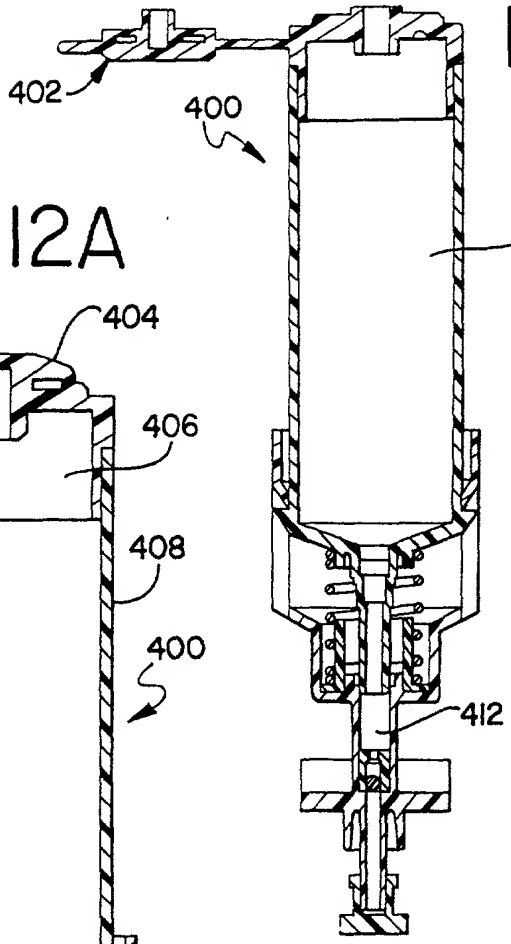


FIG. 12C

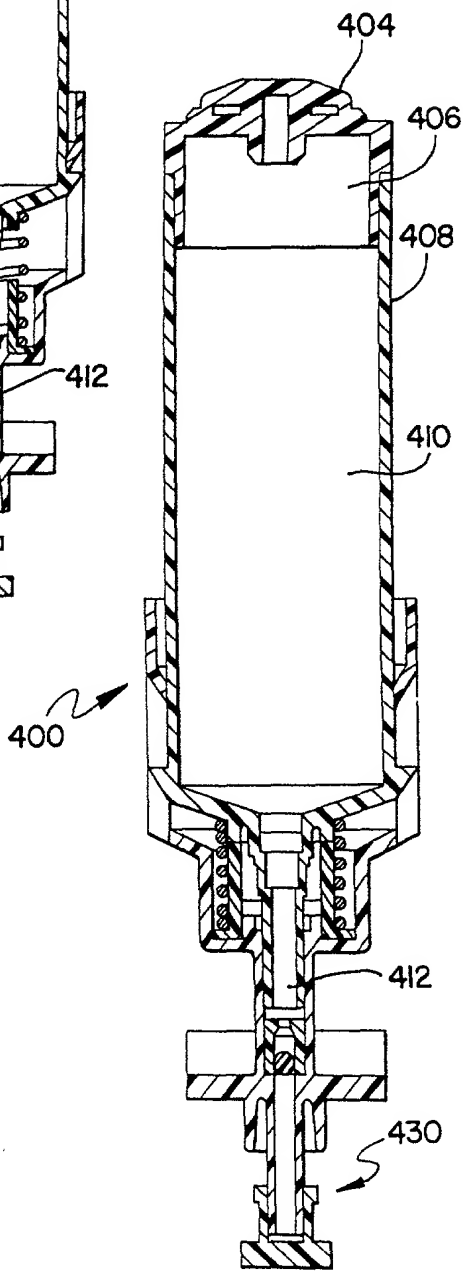


FIG. 13A

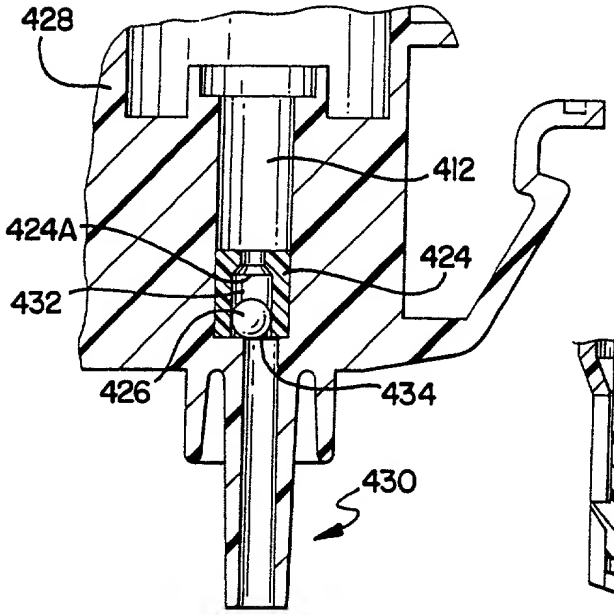


FIG. 13B

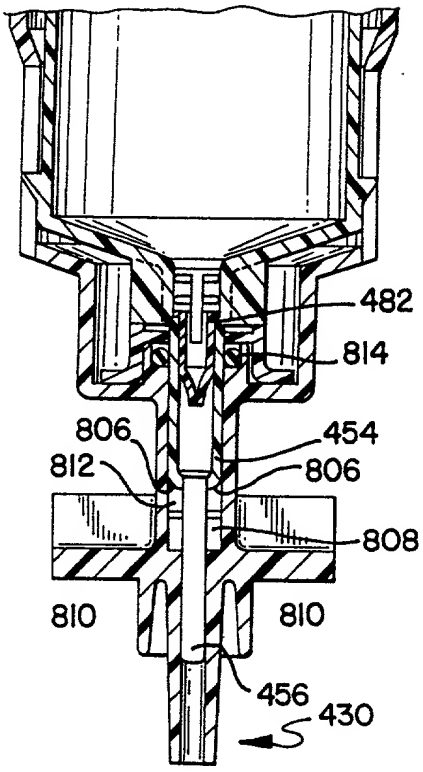
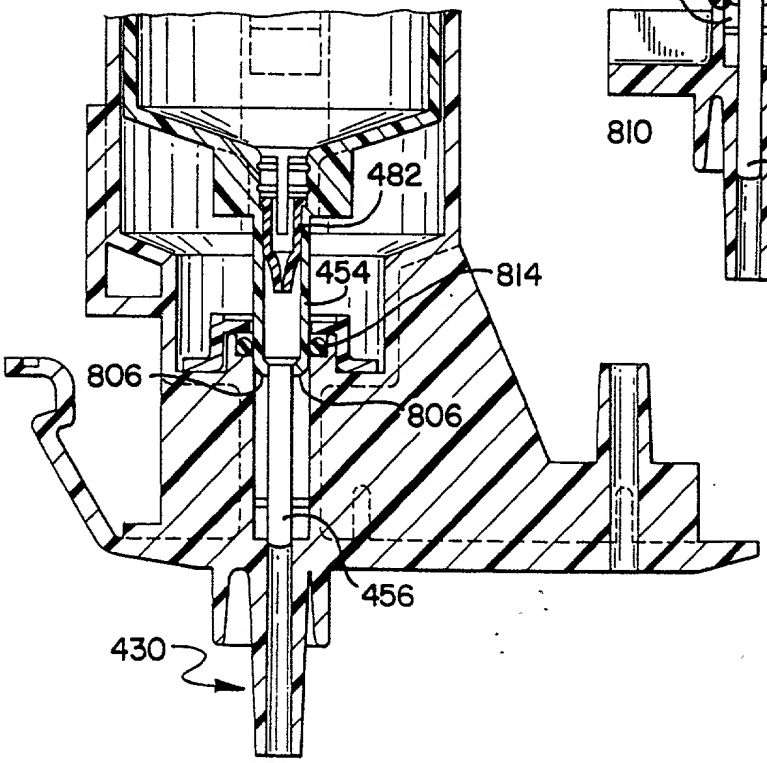


FIG. 13C



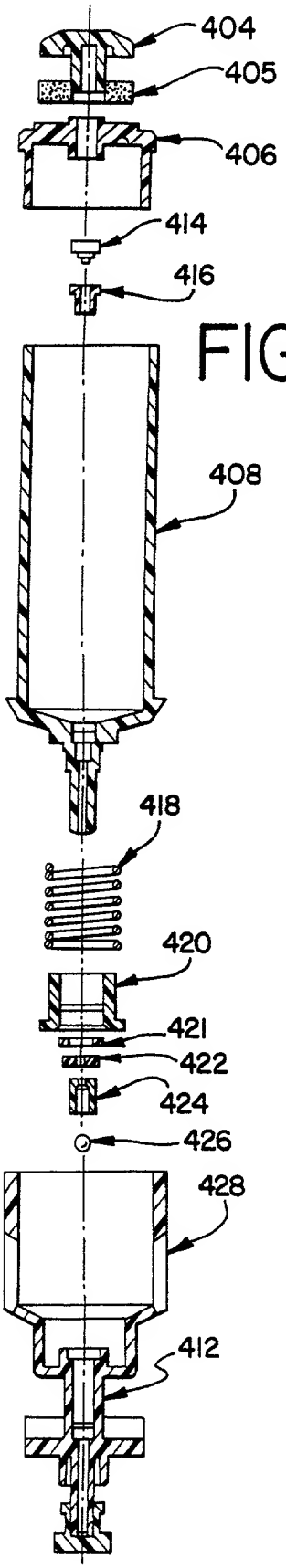


FIG. 14A

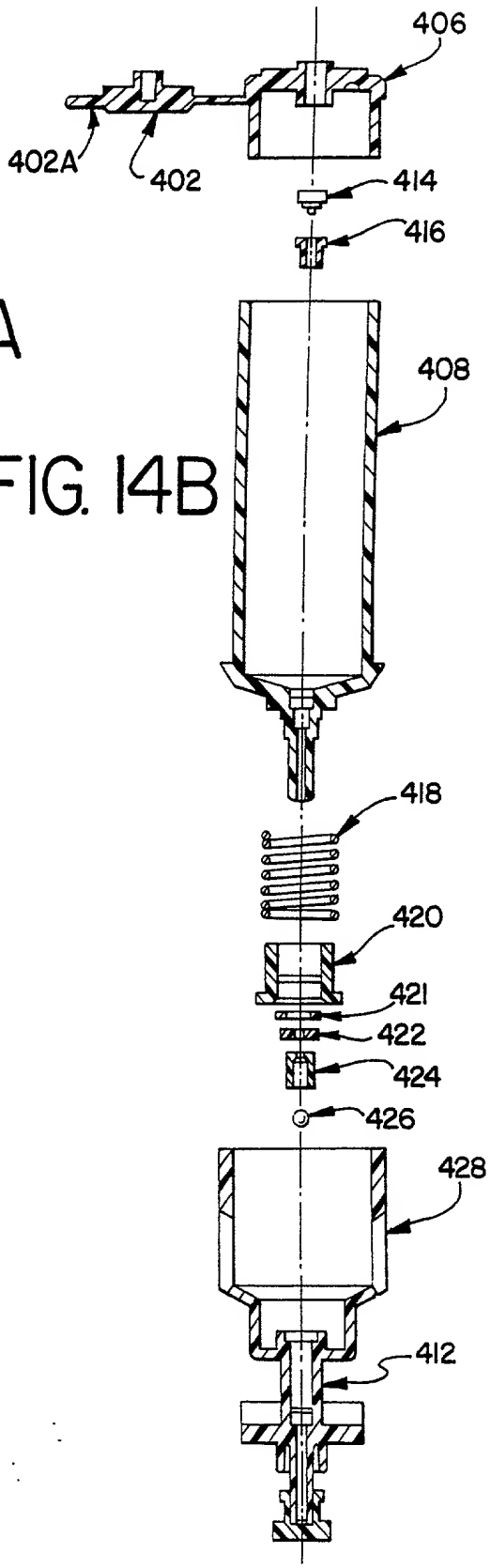


FIG. 14B

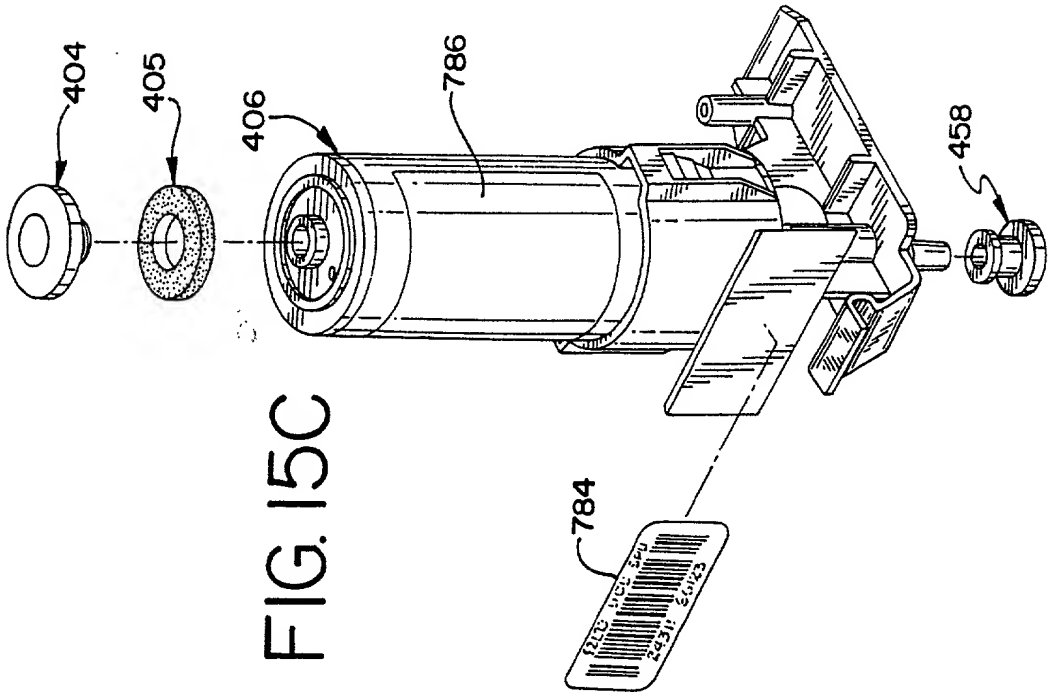


FIG. 15C

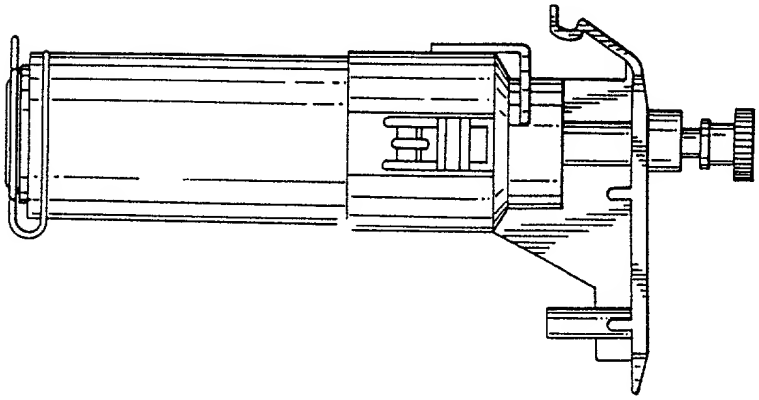


FIG. 15B

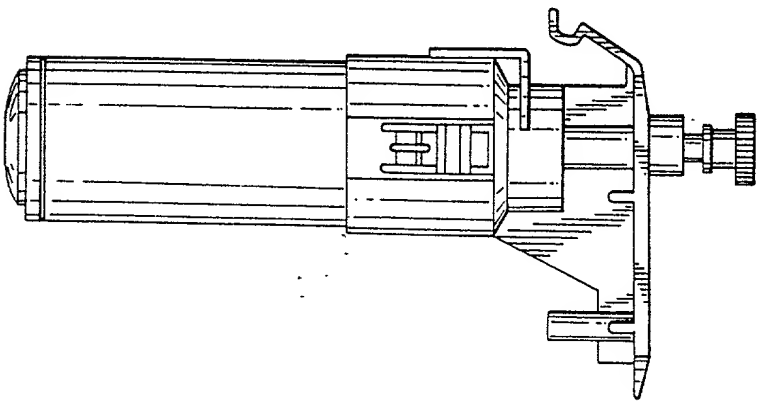


FIG. 15A

FIG. 16A

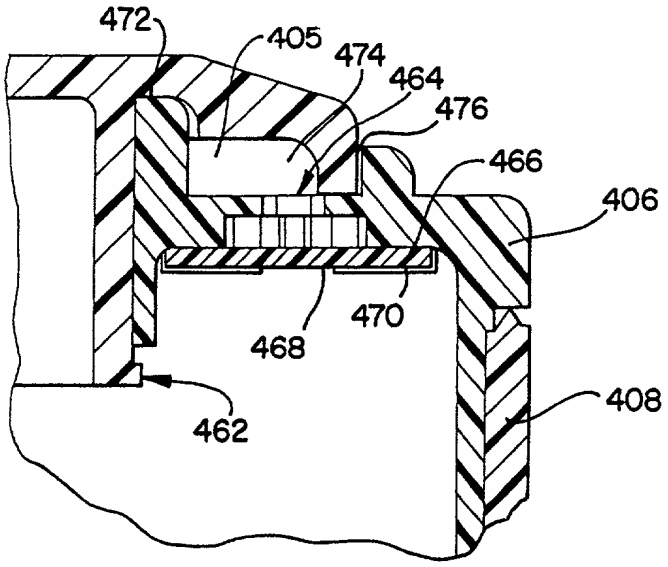


FIG. 16B

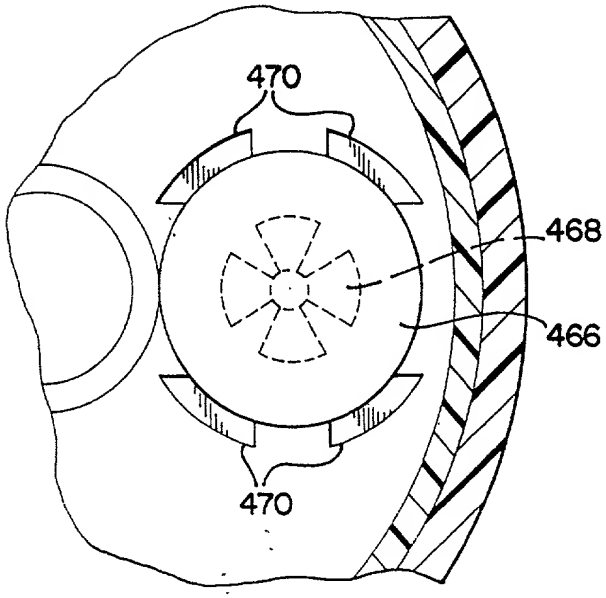


FIG. 16C

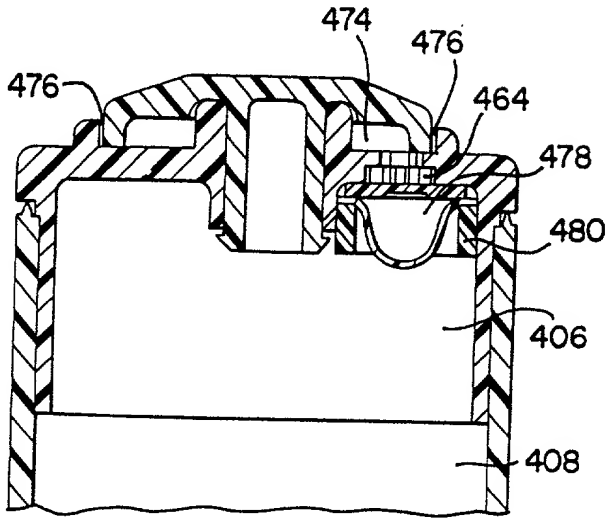


FIG. 16D

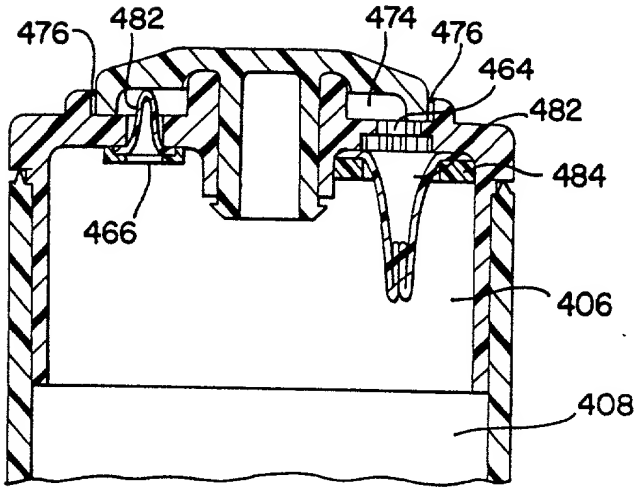


FIG. 16E

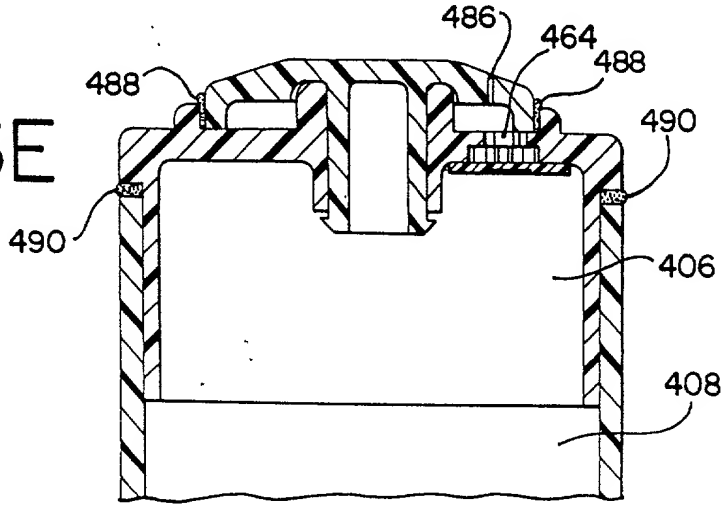
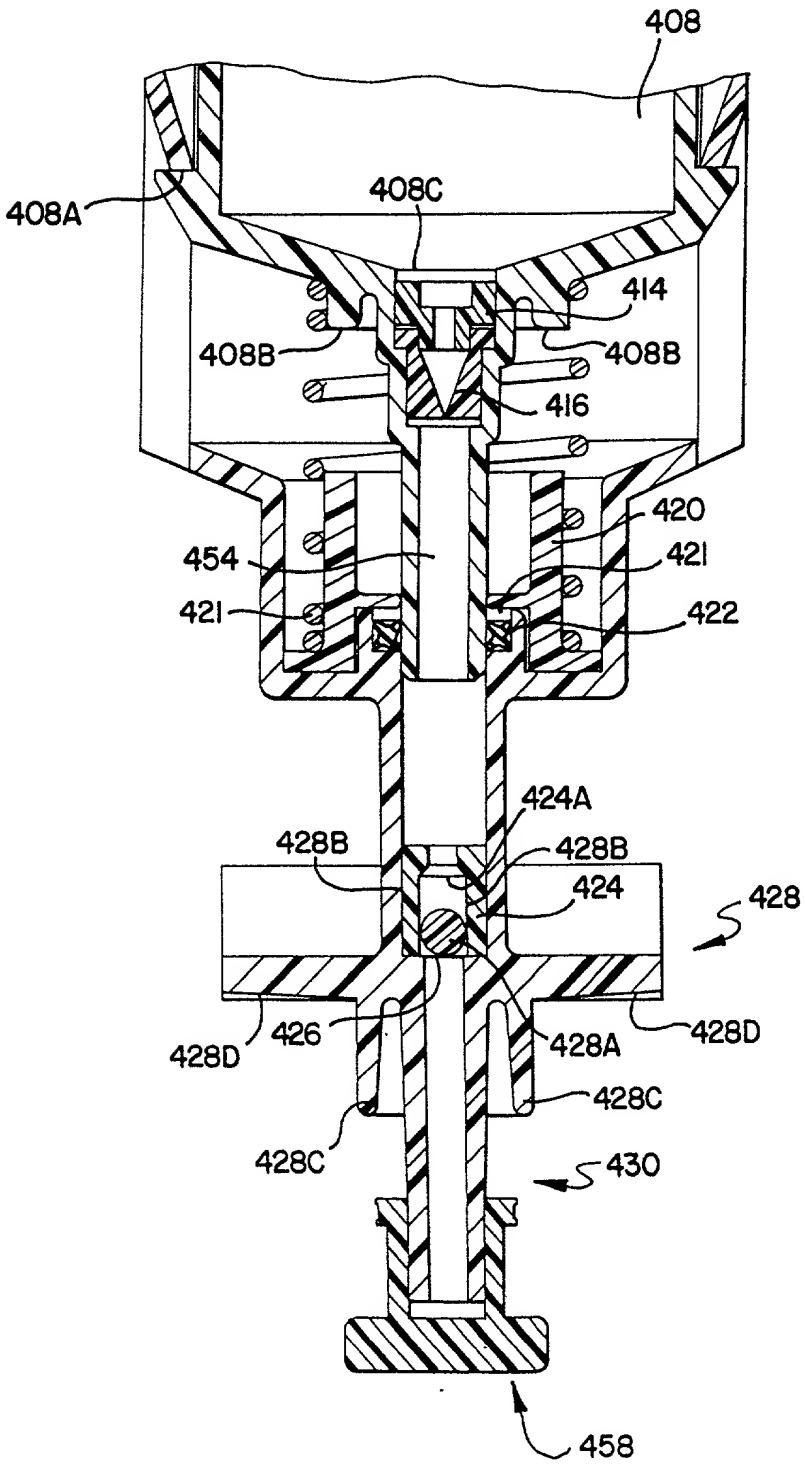


FIG. 17A


408
408A
408C
414
408B
408B
416
420
454
421
421
422
424A
428B
428B
424
428
428D
426
428A
428D
428C
428C
430
458

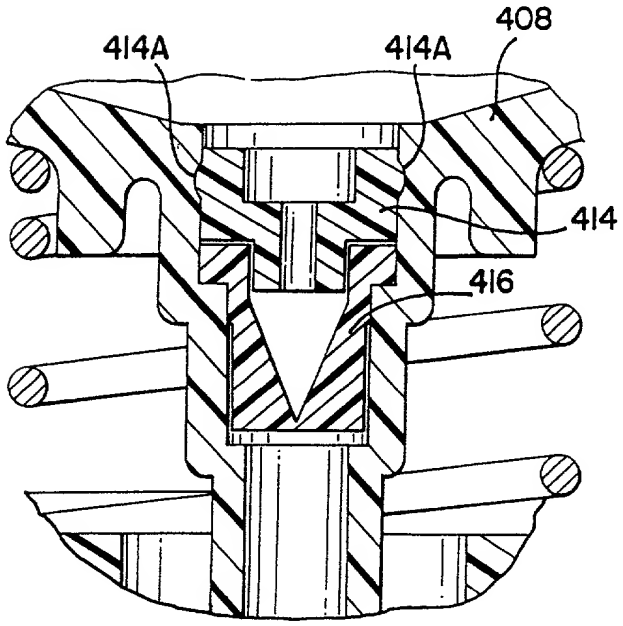
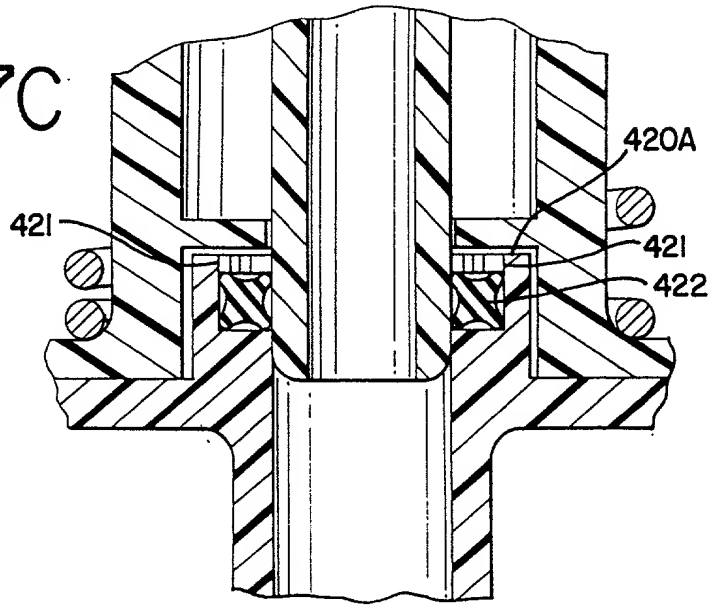


FIG. 17B

FIG. 17C



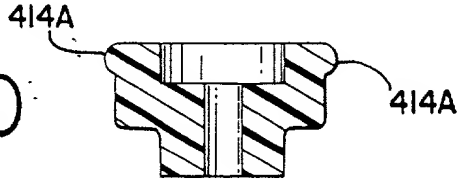


FIG. 17D

FIG. 18A

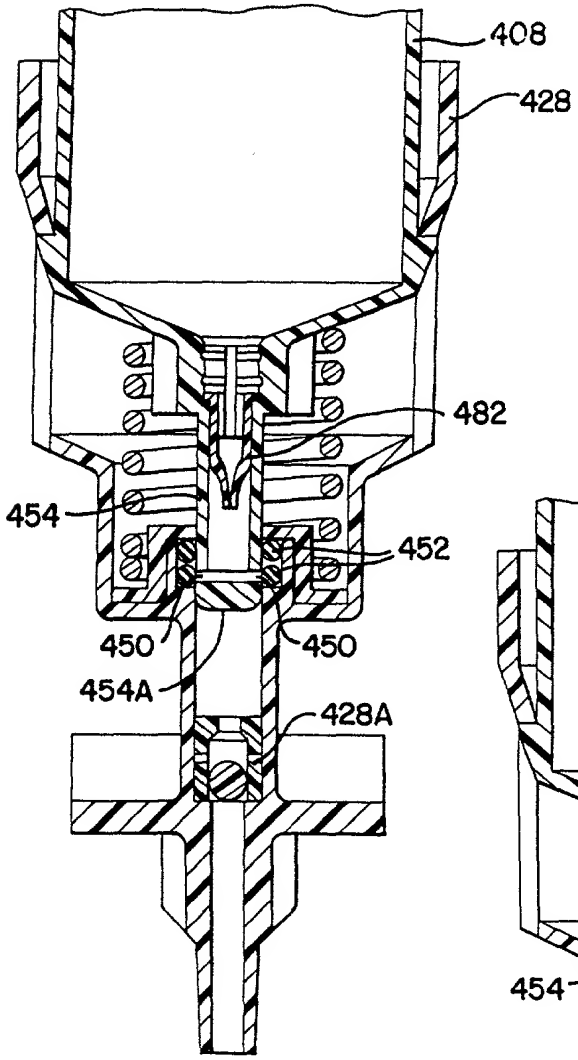


FIG. 18B

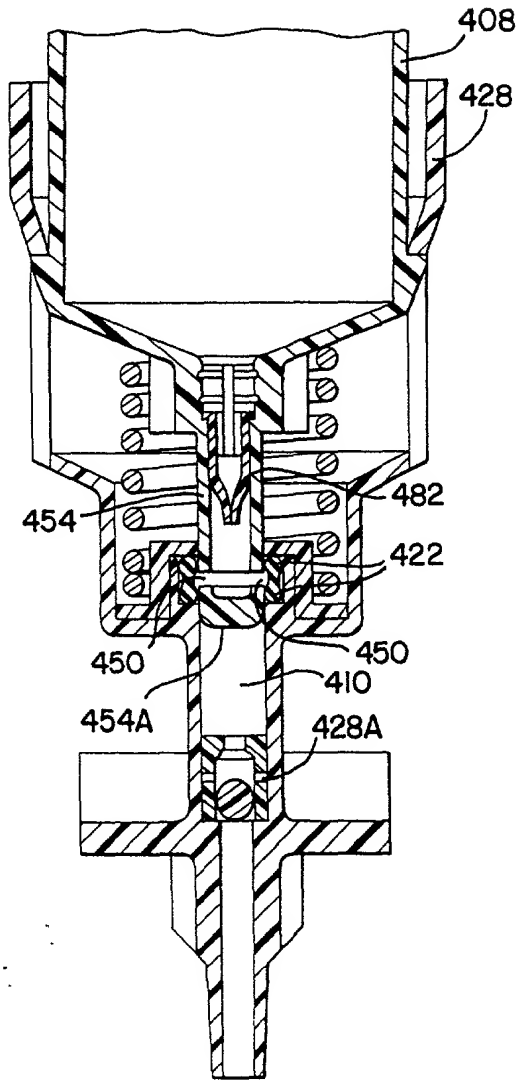


FIG. 19A

FIG. 19B

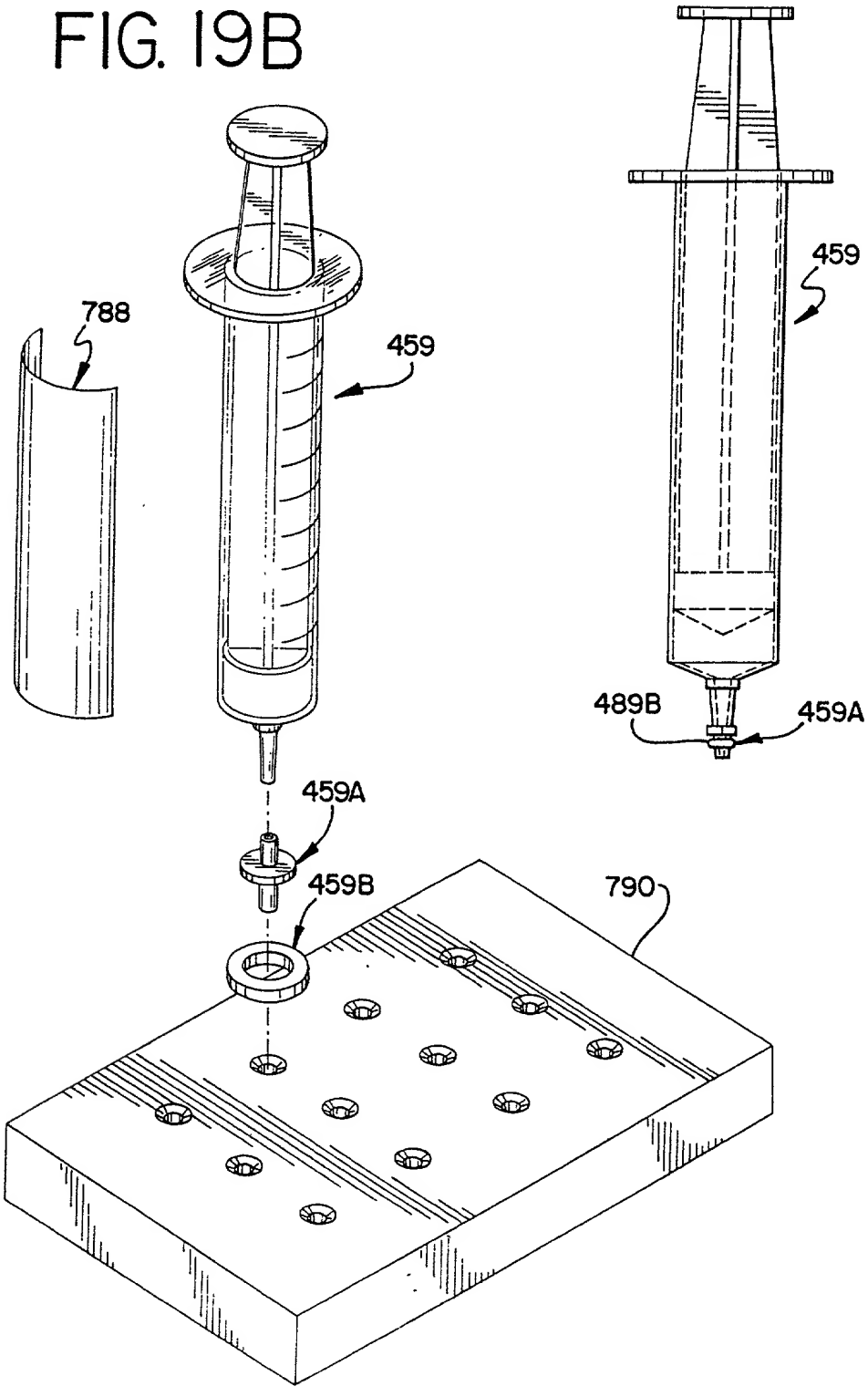


FIG. 20

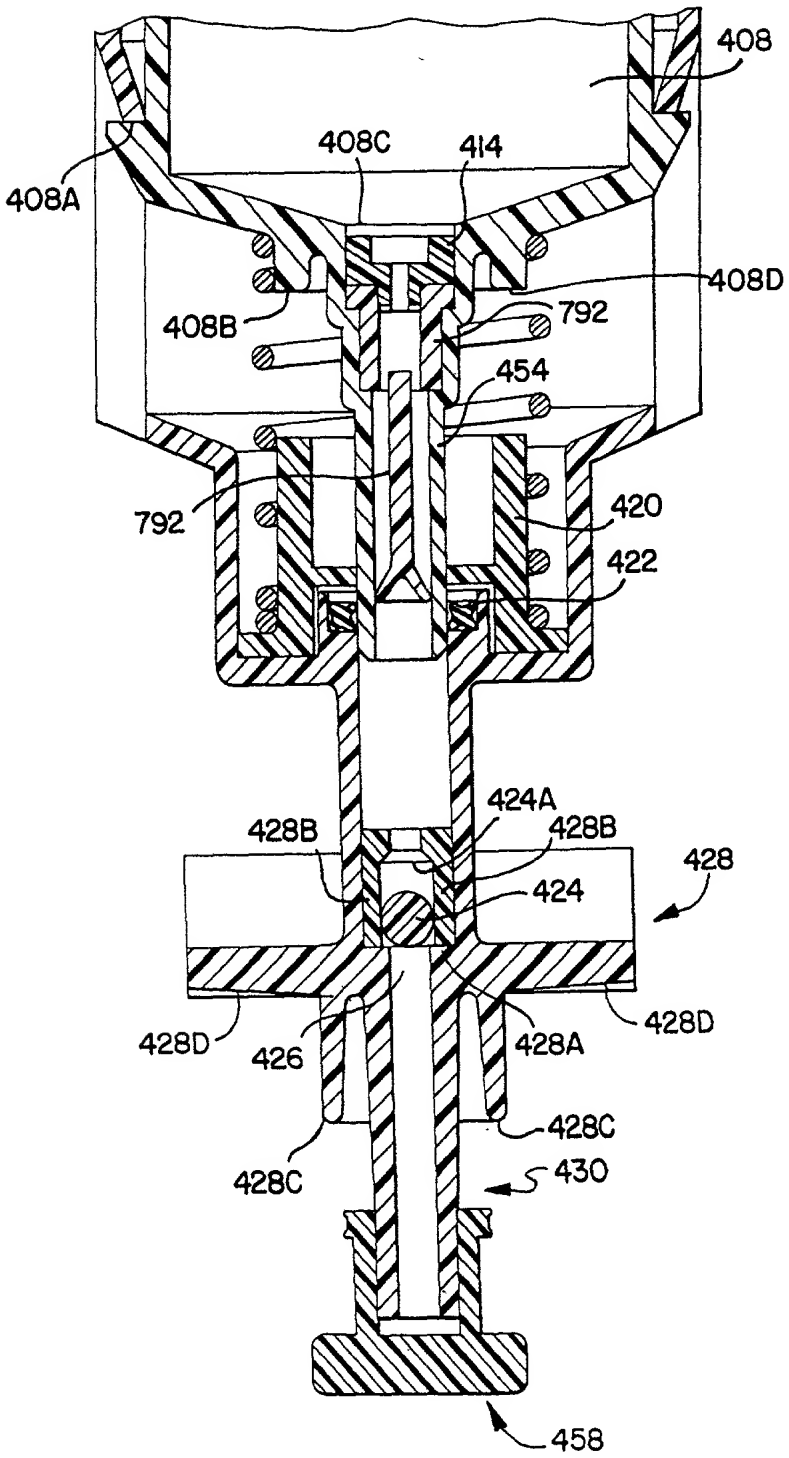

408
408C
414
408A
408D
792
408B
454
792
420
422
424A
428B
428B
428
424
428D
426
428A
428D
428C
428C
430
458

FIG. 21A

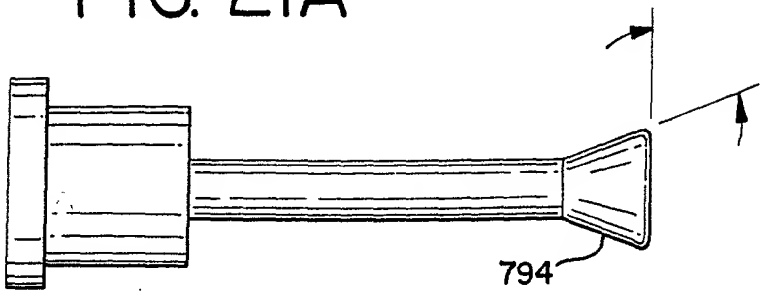


FIG. 21B

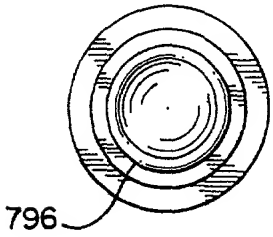


FIG. 21C

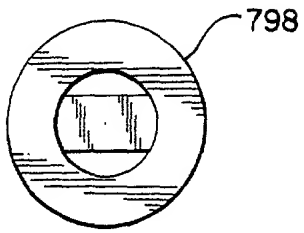


FIG. 21D

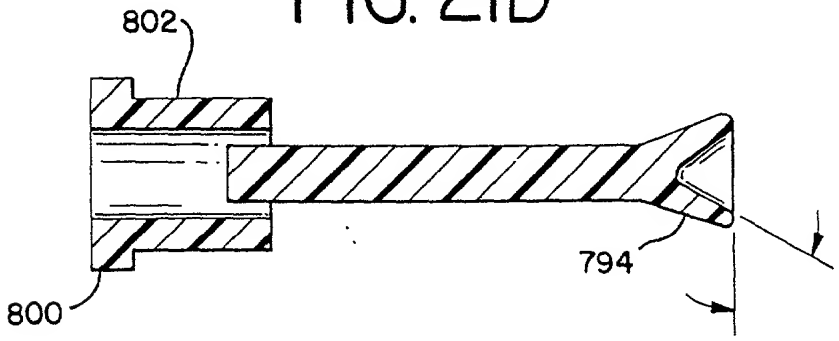
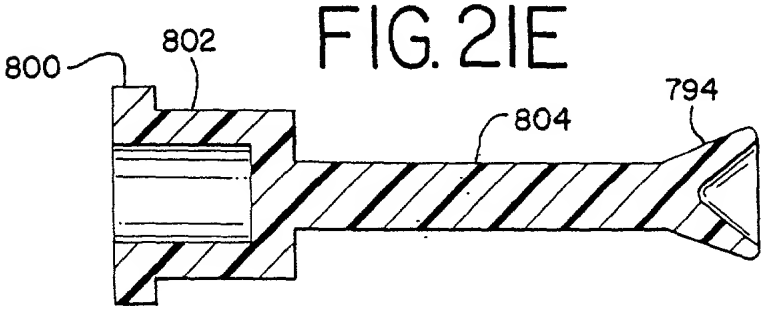


FIG. 21E



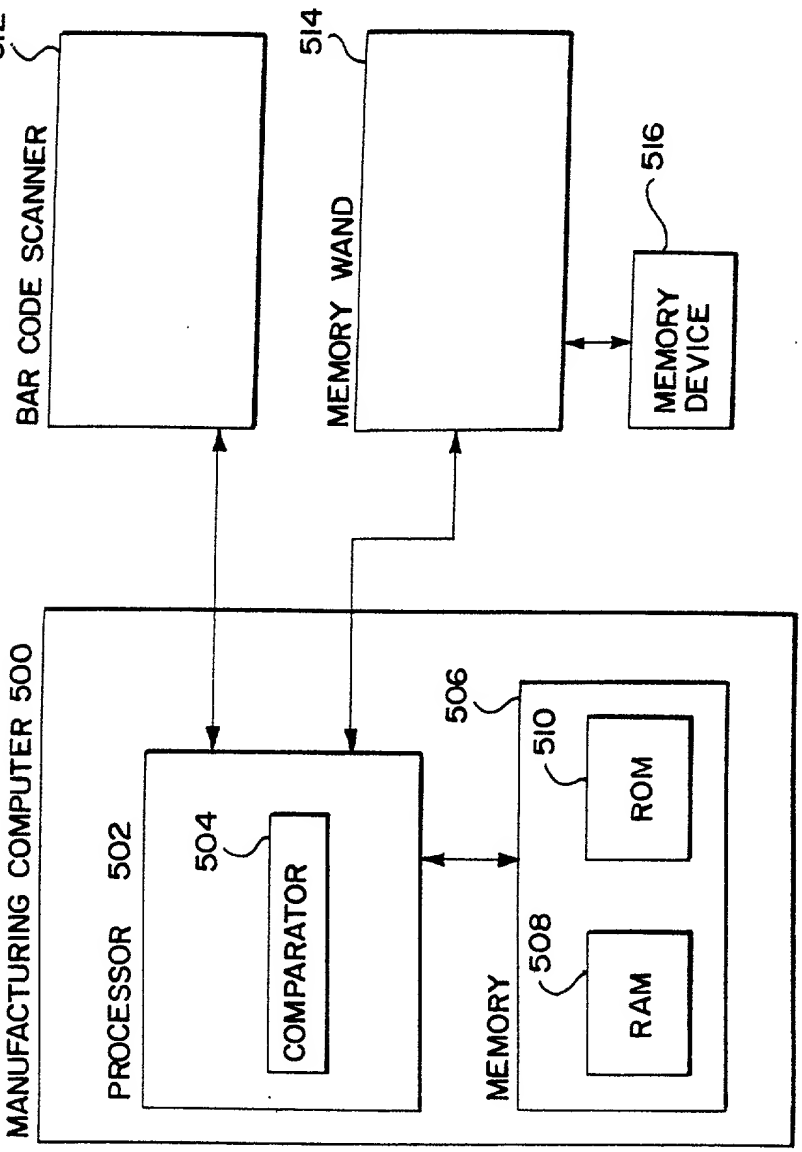

512
BAR CODE SCANNER
514
MEMORY WAND
516
MEMORY DEVICE
MANUFACTURING COMPUTER 500
PROCESSOR 502
504
COMPARATOR
506
MEMORY
508
RAM
510
ROM

FIG. 22

FIG. 23A

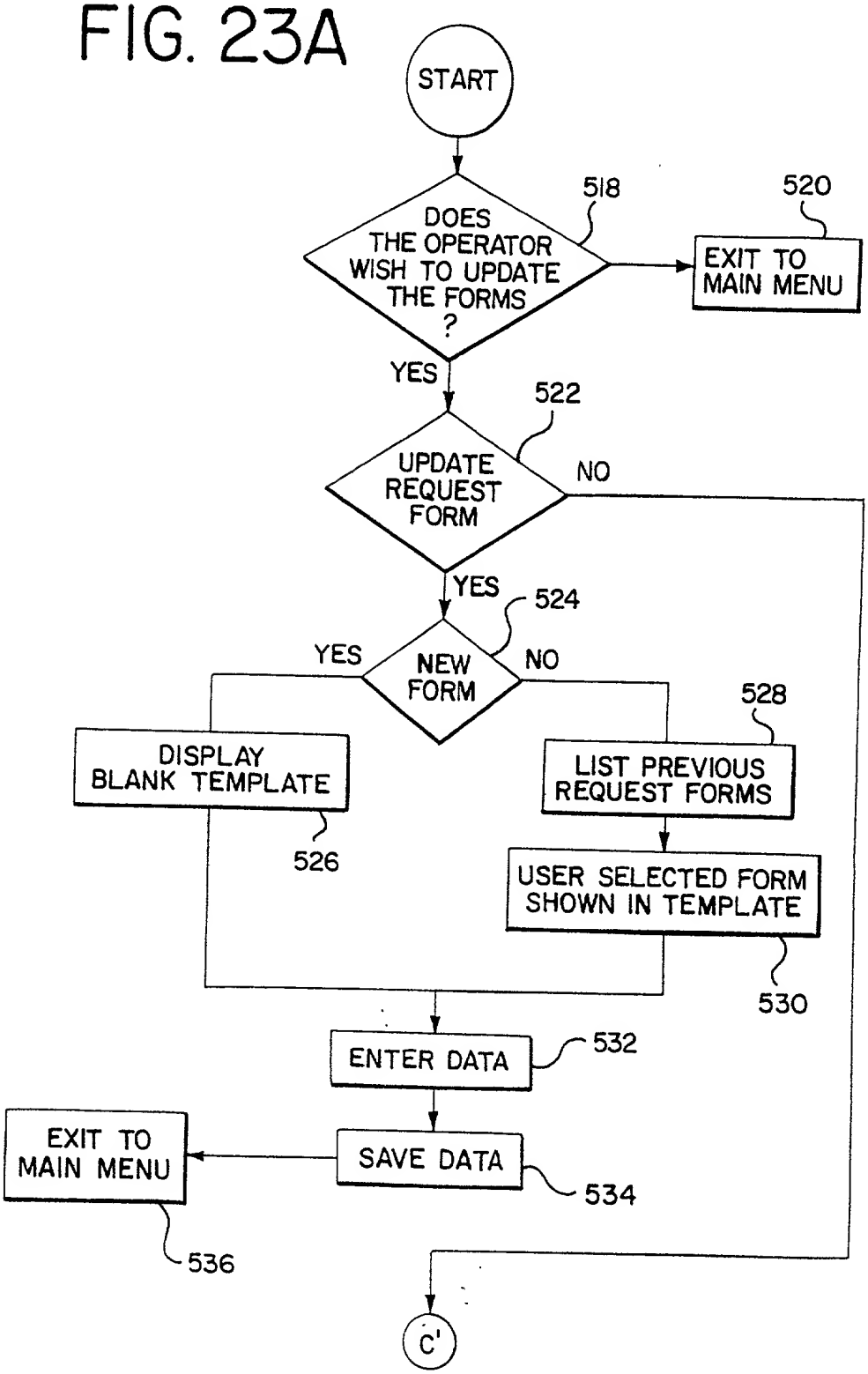

START
518
DOES THE OPERATOR WISH TO UPDATE THE FORMS ?
520
EXIT TO MAIN MENU
YES
522
UPDATE REQUEST FORM
NO
YES
524
NEW FORM
YES
NO
528
DISPLAY BLANK TEMPLATE
526
LIST PREVIOUS REQUEST FORMS
USER SELECTED FORM SHOWN IN TEMPLATE
530
ENTER DATA
532
EXIT TO MAIN MENU
SAVE DATA
534
536
C'

FIG. 23B

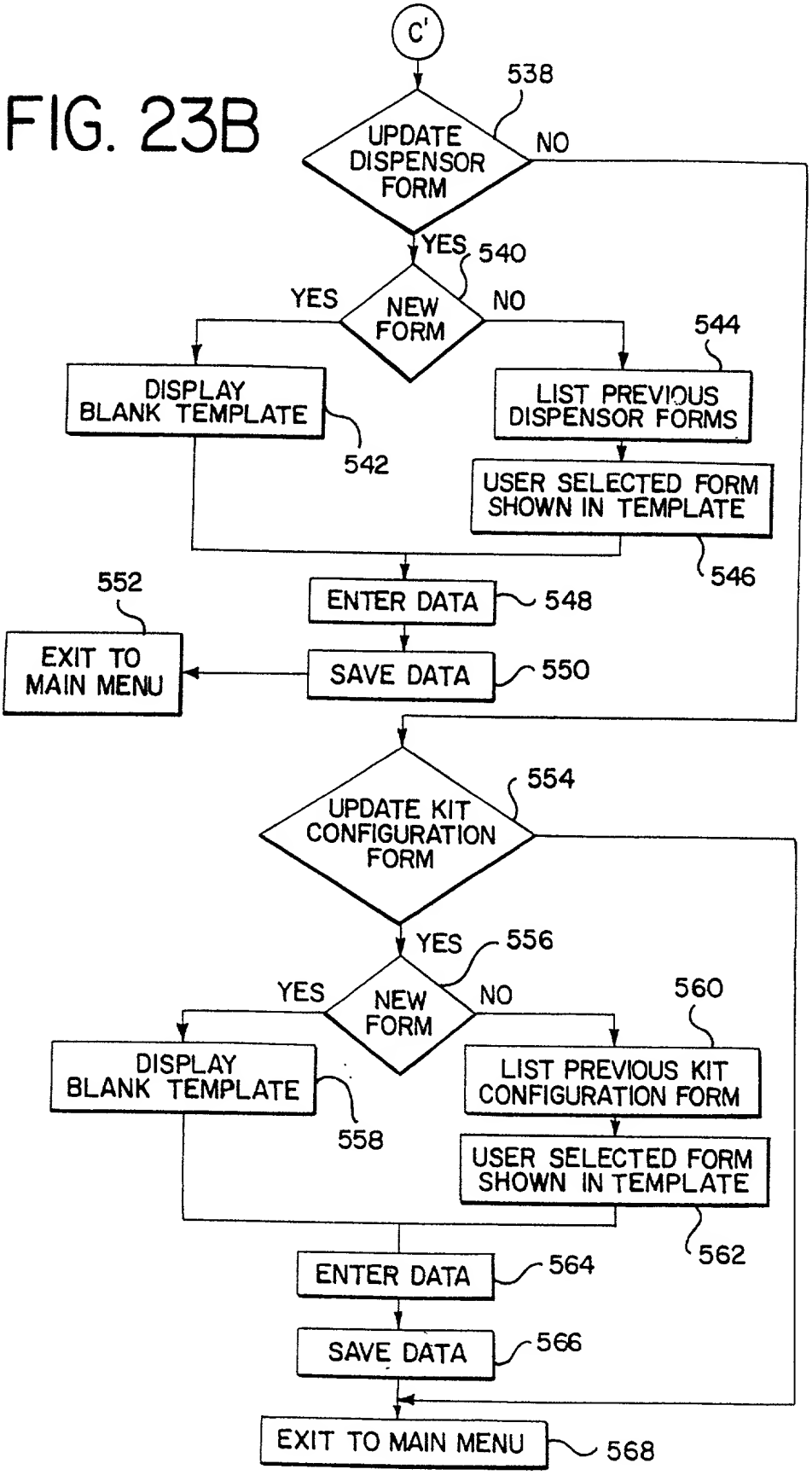

C'
538
UPDATE DISPENSOR FORM
NO
YES
540
YES
NEW FORM
NO
544
DISPLAY BLANK TEMPLATE
542
LIST PREVIOUS DISPENSOR FORMS
USER SELECTED FORM SHOWN IN TEMPLATE
546
552
ENTER DATA
548
EXIT TO MAIN MENU
SAVE DATA
550
554
UPDATE KIT CONFIGURATION FORM
YES
556
YES
NEW FORM
NO
560
DISPLAY BLANK TEMPLATE
558
LIST PREVIOUS KIT CONFIGURATION FORM
USER SELECTED FORM SHOWN IN TEMPLATE
562
ENTER DATA
564
SAVE DATA
566
EXIT TO MAIN MENU
568

FIG. 24A

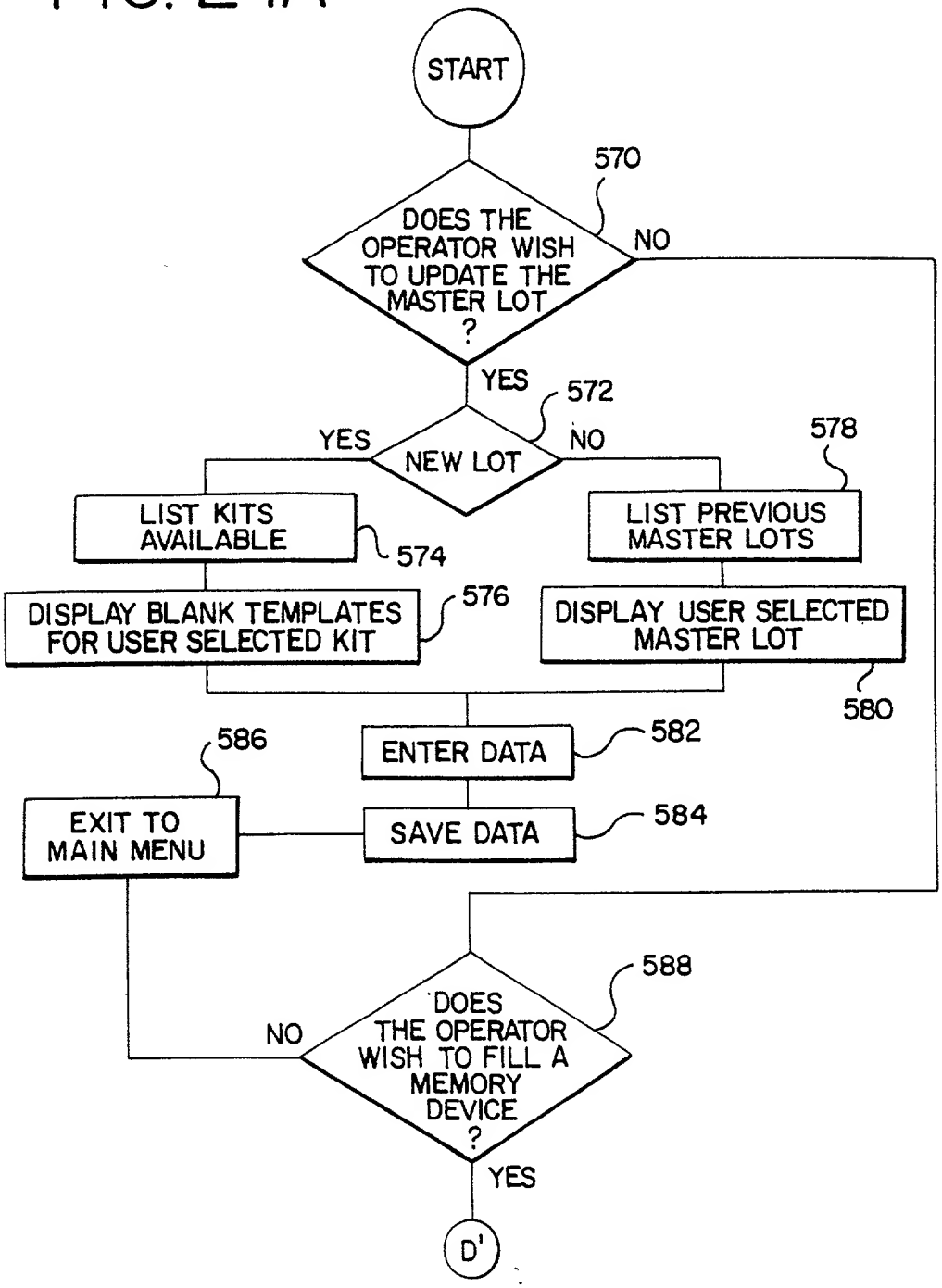
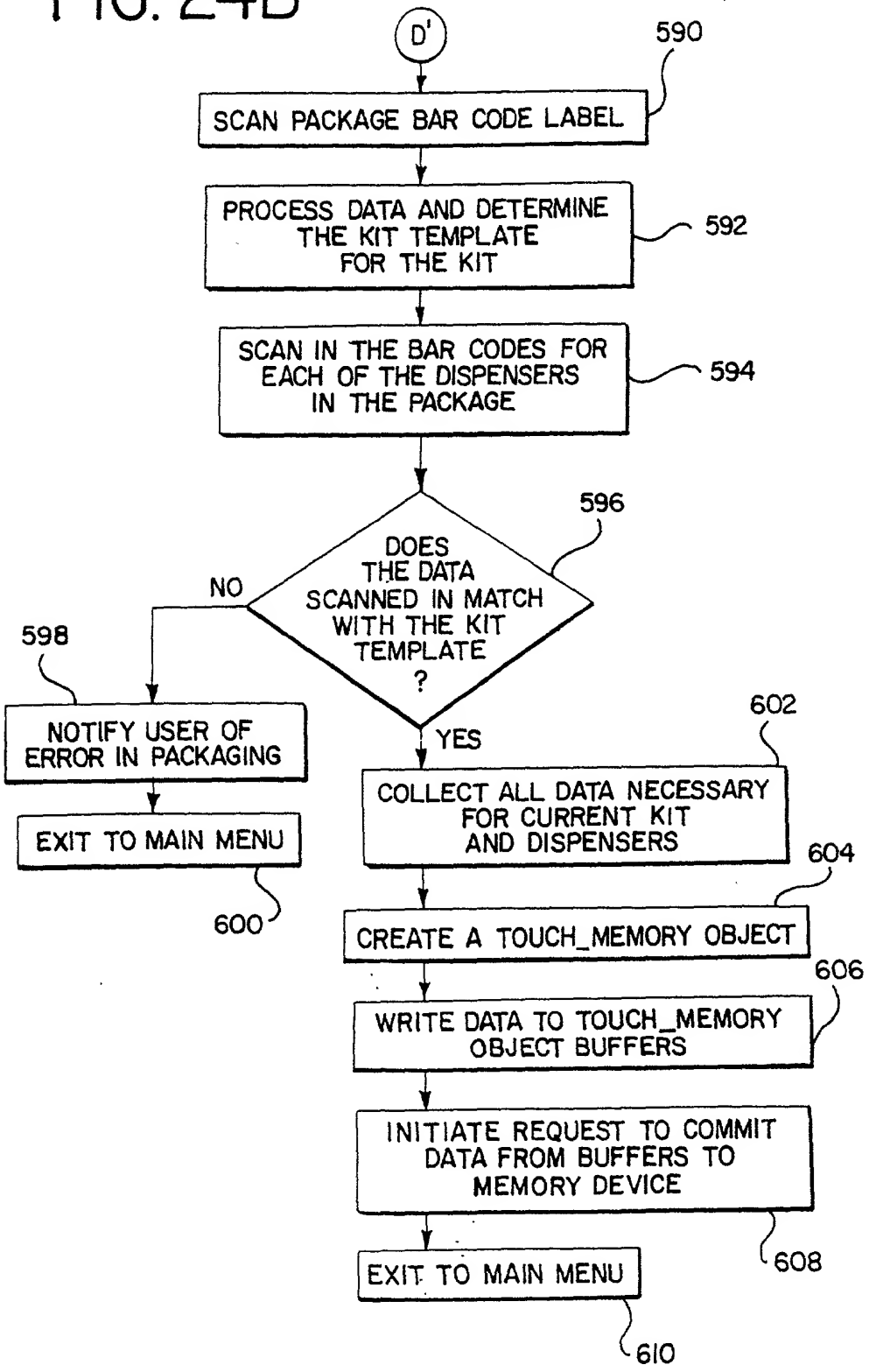

START
570
DOES THE OPERATOR WISH TO UPDATE THE MASTER LOT ?
NO
YES
572
YES
NEW LOT
NO
578
LIST KITS AVAILABLE
574
LIST PREVIOUS MASTER LOTS
DISPLAY BLANK TEMPLATES FOR USER SELECTED KIT
576
DISPLAY USER SELECTED MASTER LOT
580
586
ENTER DATA
582
EXIT TO MAIN MENU
SAVE DATA
584
588
DOES THE OPERATOR WISH TO FILL A MEMORY DEVICE ?
NO
YES
D'

FIG. 24B


D'
590
SCAN PACKAGE BAR CODE LABEL
PROCESS DATA AND DETERMINE THE KIT TEMPLATE FOR THE KIT
592
SCAN IN THE BAR CODES FOR EACH OF THE DISPENSERS IN THE PACKAGE
594
596
DOES THE DATA SCANNED IN MATCH WITH THE KIT TEMPLATE ?
NO
YES
598
NOTIFY USER OF ERROR IN PACKAGING
EXIT TO MAIN MENU
600
602
COLLECT ALL DATA NECESSARY FOR CURRENT KIT AND DISPENSERS
604
CREATE A TOUCH_MEMORY OBJECT
606
WRITE DATA TO TOUCH_MEMORY OBJECT BUFFERS
INITIATE REQUEST TO COMMIT DATA FROM BUFFERS TO MEMORY DEVICE
608
EXIT TO MAIN MENU
610

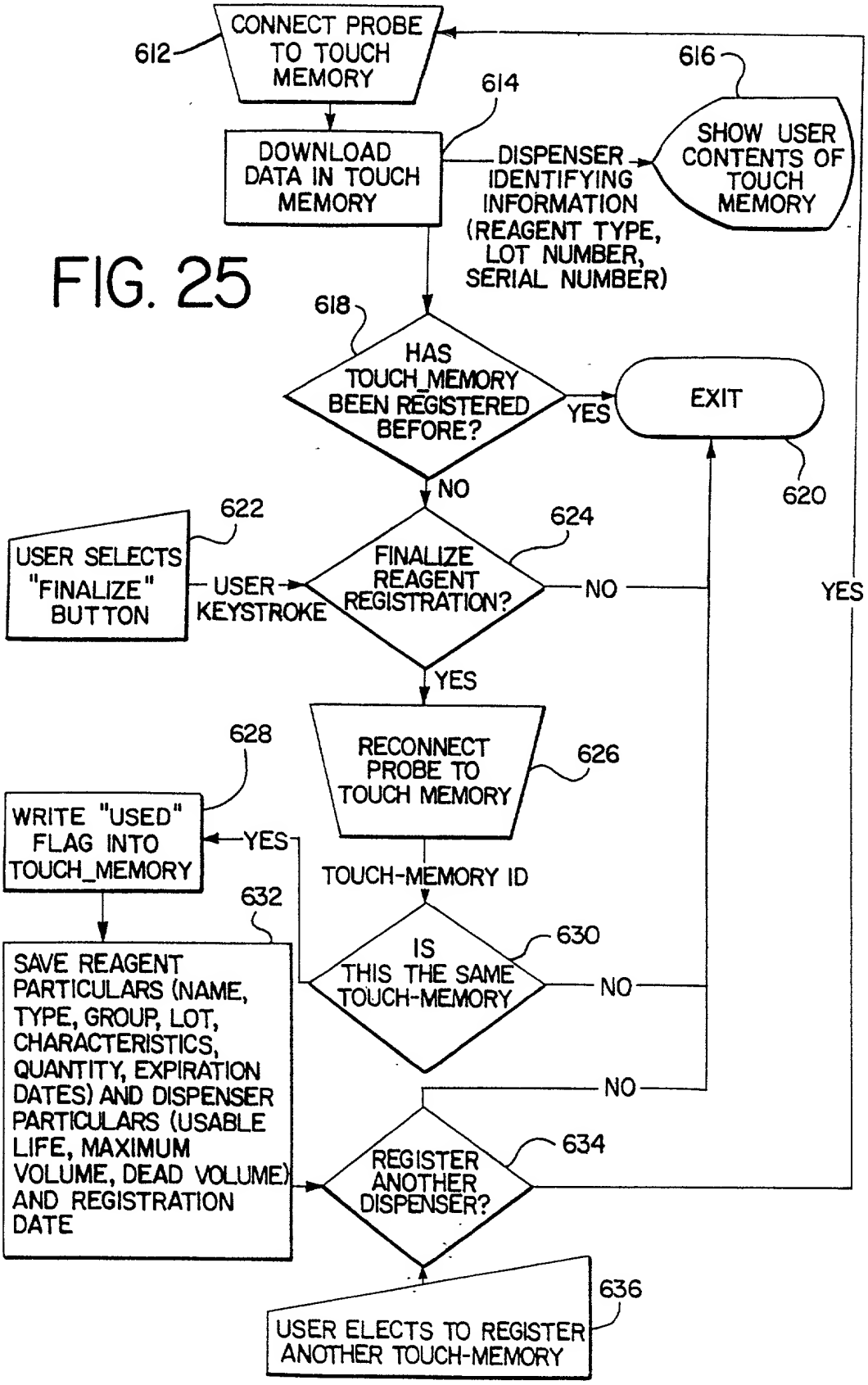

612
CONNECT PROBE TO TOUCH MEMORY
614
DOWNLOAD DATA IN TOUCH MEMORY
DISPENSER IDENTIFYING INFORMATION (REAGENT TYPE, LOT NUMBER, SERIAL NUMBER)
616
SHOW USER CONTENTS OF TOUCH MEMORY
618
HAS TOUCH_MEMORY BEEN REGISTERED BEFORE?
YES
EXIT
620
NO
622
USER SELECTS "FINALIZE" BUTTON
USER KEYSTROKE
624
FINALIZE REAGENT REGISTRATION?
NO
YES
YES
626
RECONNECT PROBE TO TOUCH MEMORY
628
WRITE "USED" FLAG INTO TOUCH_MEMORY
YES
TOUCH-MEMORY ID
630
IS THIS THE SAME TOUCH-MEMORY
NO
632
SAVE REAGENT PARTICULARS (NAME, TYPE, GROUP, LOT, CHARACTERISTICS, QUANTITY, EXPIRATION DATES) AND DISPENSER PARTICULARS (USABLE LIFE, MAXIMUM VOLUME, DEAD VOLUME) AND REGISTRATION DATE
NO
634
REGISTER ANOTHER DISPENSER?
636
USER ELECTS TO REGISTER ANOTHER TOUCH-MEMORY

FIG. 25

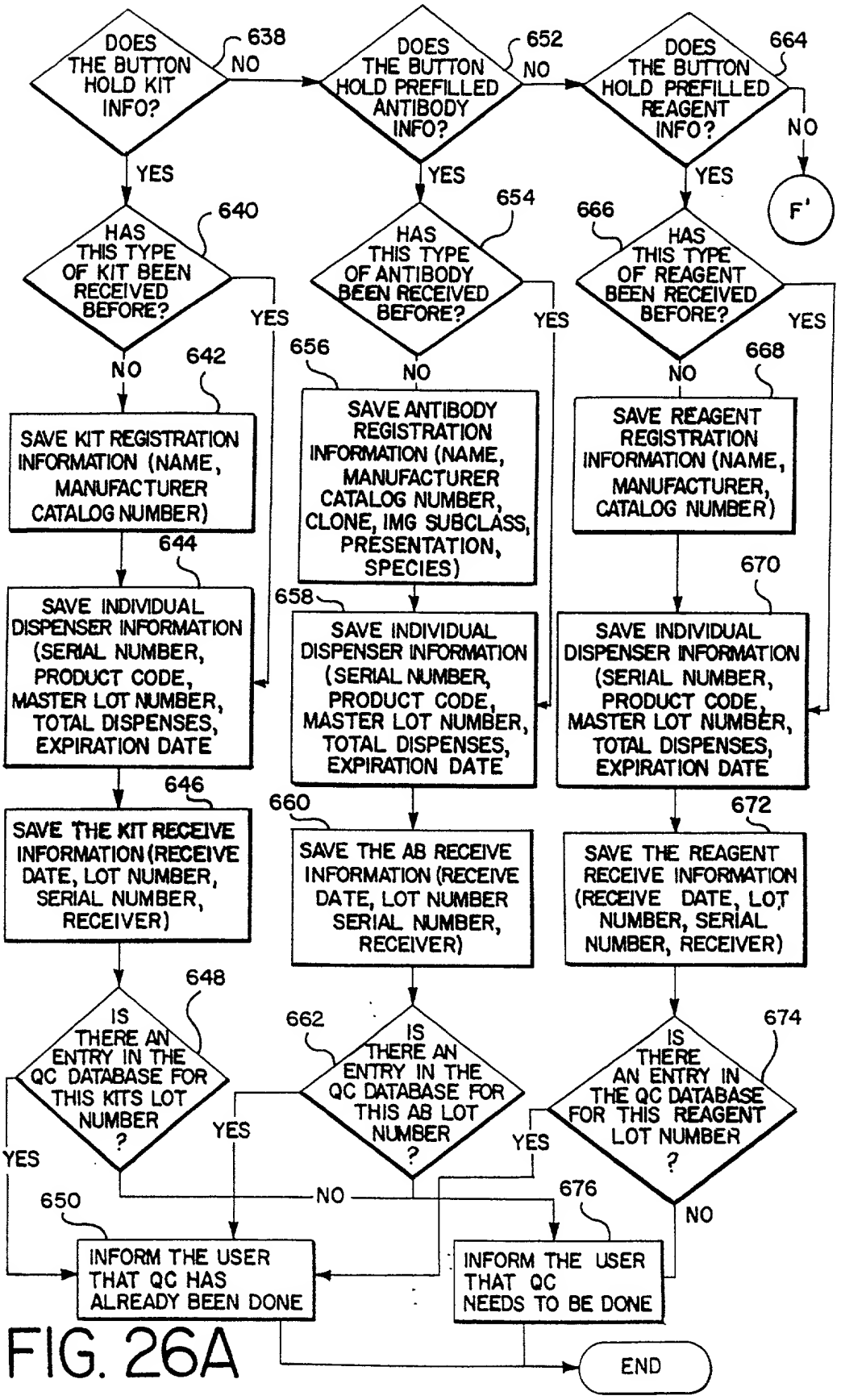

DOES THE BUTTON HOLD KIT INFO?
638
NO
DOES THE BUTTON HOLD PREFILLED ANTIBODY INFO?
652
NO
DOES THE BUTTON HOLD PREFILLED REAGENT INFO?
664
NO
F'
YES
YES
YES
HAS THIS TYPE OF KIT BEEN RECEIVED BEFORE?
640
HAS THIS TYPE OF ANTIBODY BEEN RECEIVED BEFORE?
654
HAS THIS TYPE OF REAGENT BEEN RECEIVED BEFORE?
666
YES
YES
YES
NO
642
NO
656
NO
668
SAVE KIT REGISTRATION INFORMATION (NAME, MANUFACTURER CATALOG NUMBER)
SAVE ANTIBODY REGISTRATION INFORMATION (NAME, MANUFACTURER CATALOG NUMBER, CLONE, IMG SUBCLASS, PRESENTATION, SPECIES)
SAVE REAGENT REGISTRATION INFORMATION (NAME, MANUFACTURER, CATALOG NUMBER)
644
658
670
SAVE INDIVIDUAL DISPENSER INFORMATION (SERIAL NUMBER, PRODUCT CODE, MASTER LOT NUMBER, TOTAL DISPENSES, EXPIRATION DATE
SAVE INDIVIDUAL DISPENSER INFORMATION (SERIAL NUMBER, PRODUCT CODE, MASTER LOT NUMBER, TOTAL DISPENSES, EXPIRATION DATE
SAVE INDIVIDUAL DISPENSER INFORMATION (SERIAL NUMBER, PRODUCT CODE, MASTER LOT NUMBER, TOTAL DISPENSES, EXPIRATION DATE
646
660
672
SAVE THE KIT RECEIVE INFORMATION (RECEIVE DATE, LOT NUMBER, SERIAL NUMBER, RECEIVER)
SAVE THE AB RECEIVE INFORMATION (RECEIVE DATE, LOT NUMBER SERIAL NUMBER, RECEIVER)
SAVE THE REAGENT RECEIVE INFORMATION (RECEIVE DATE, LOT NUMBER, SERIAL NUMBER, RECEIVER)
648
662
674
IS THERE AN ENTRY IN THE QC DATABASE FOR THIS KITS LOT NUMBER ?
IS THERE AN ENTRY IN THE QC DATABASE FOR THIS AB LOT NUMBER ?
IS THERE AN ENTRY IN THE QC DATABASE FOR THIS REAGENT LOT NUMBER ?
YES
YES
YES
NO
650
676
NO
INFORM THE USER THAT QC HAS ALREADY BEEN DONE
INFORM THE USER THAT QC NEEDS TO BE DONE
END

FIG. 26A

FIG. 26B

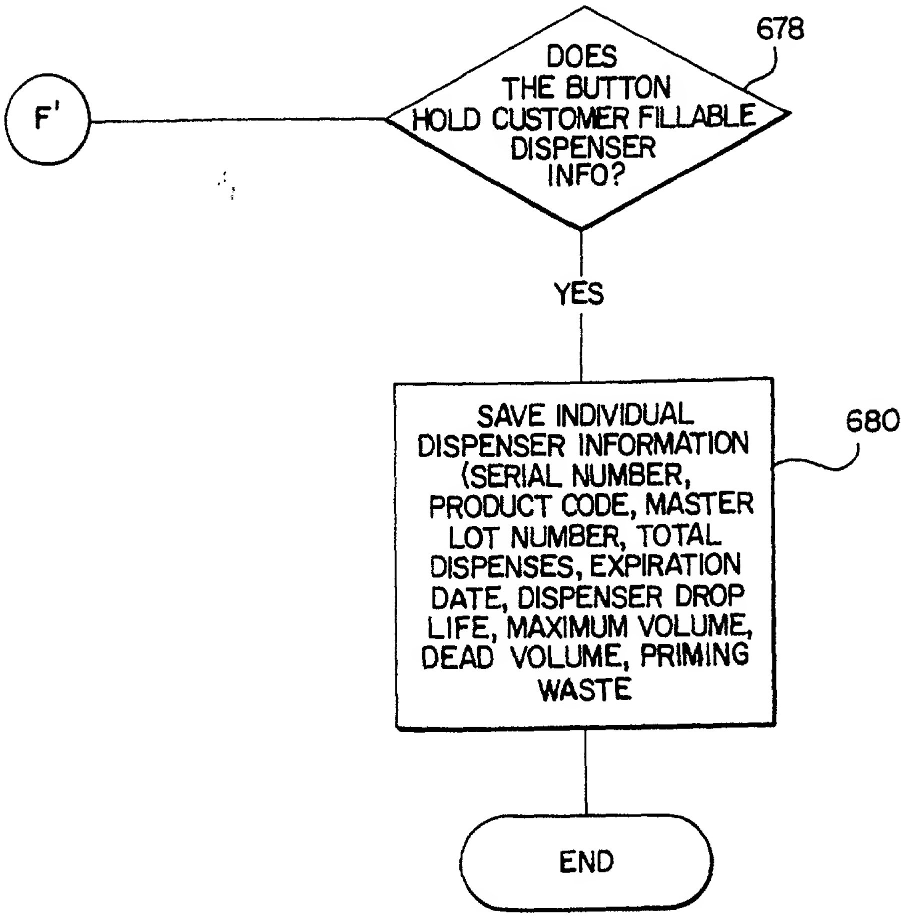

678
F'
DOES THE BUTTON HOLD CUSTOMER FILLABLE DISPENSER INFO?
YES
SAVE INDIVIDUAL DISPENSER INFORMATION (SERIAL NUMBER, PRODUCT CODE, MASTER LOT NUMBER, TOTAL DISPENSES, EXPIRATION DATE, DISPENSER DROP LIFE, MAXIMUM VOLUME, DEAD VOLUME, PRIMING WASTE
680
END

FIG. 27

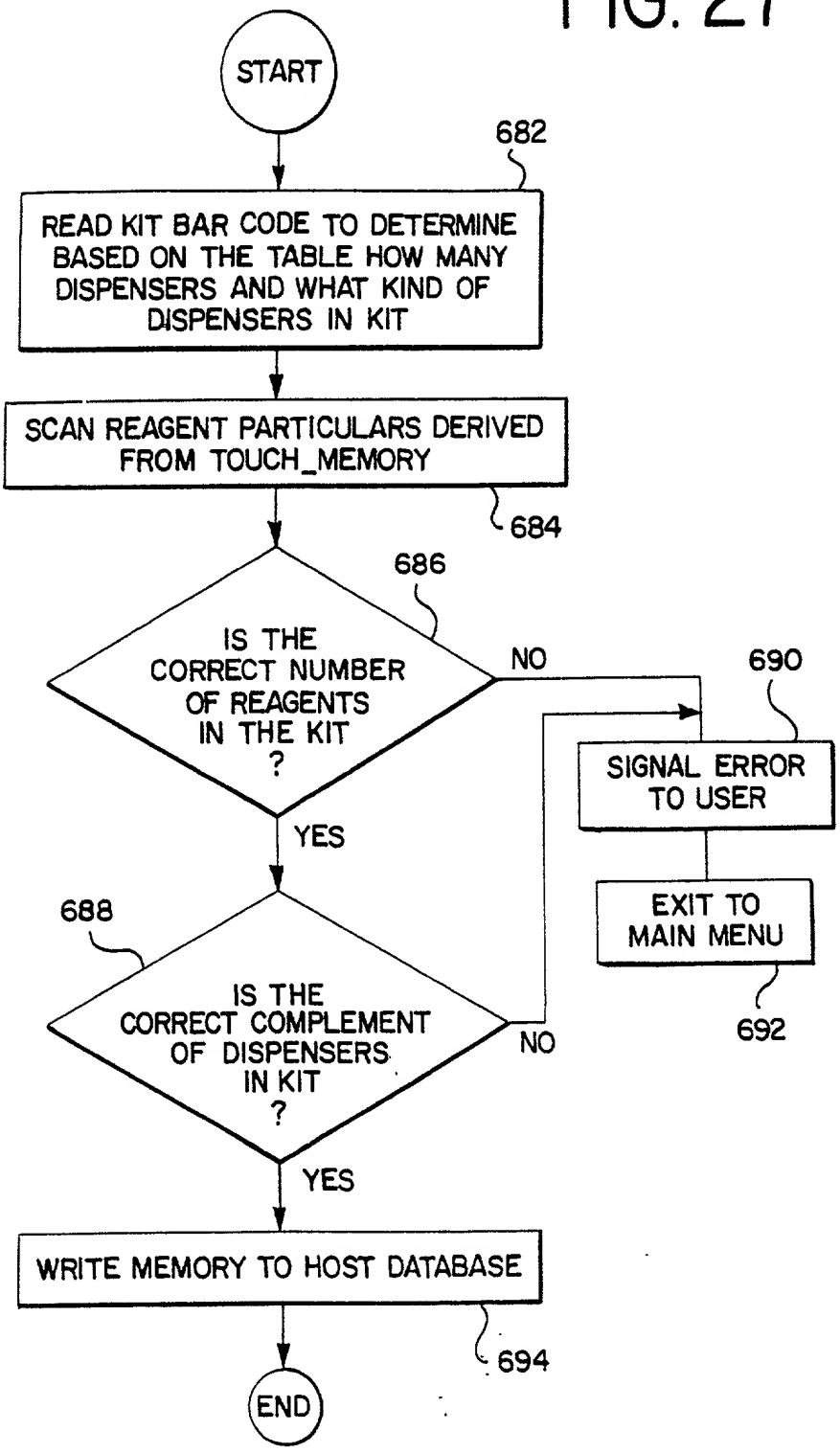

START
682
READ KIT BAR CODE TO DETERMINE BASED ON THE TABLE HOW MANY DISPENSERS AND WHAT KIND OF DISPENSERS IN KIT
SCAN REAGENT PARTICULARS DERIVED FROM TOUCH_MEMORY
684
686
IS THE CORRECT NUMBER OF REAGENTS IN THE KIT ?
NO
690
SIGNAL ERROR TO USER
EXIT TO MAIN MENU
692
YES
688
IS THE CORRECT COMPLEMENT OF DISPENSERS IN KIT ?
NO
YES
WRITE MEMORY TO HOST DATABASE
694
END

FIG. 28A

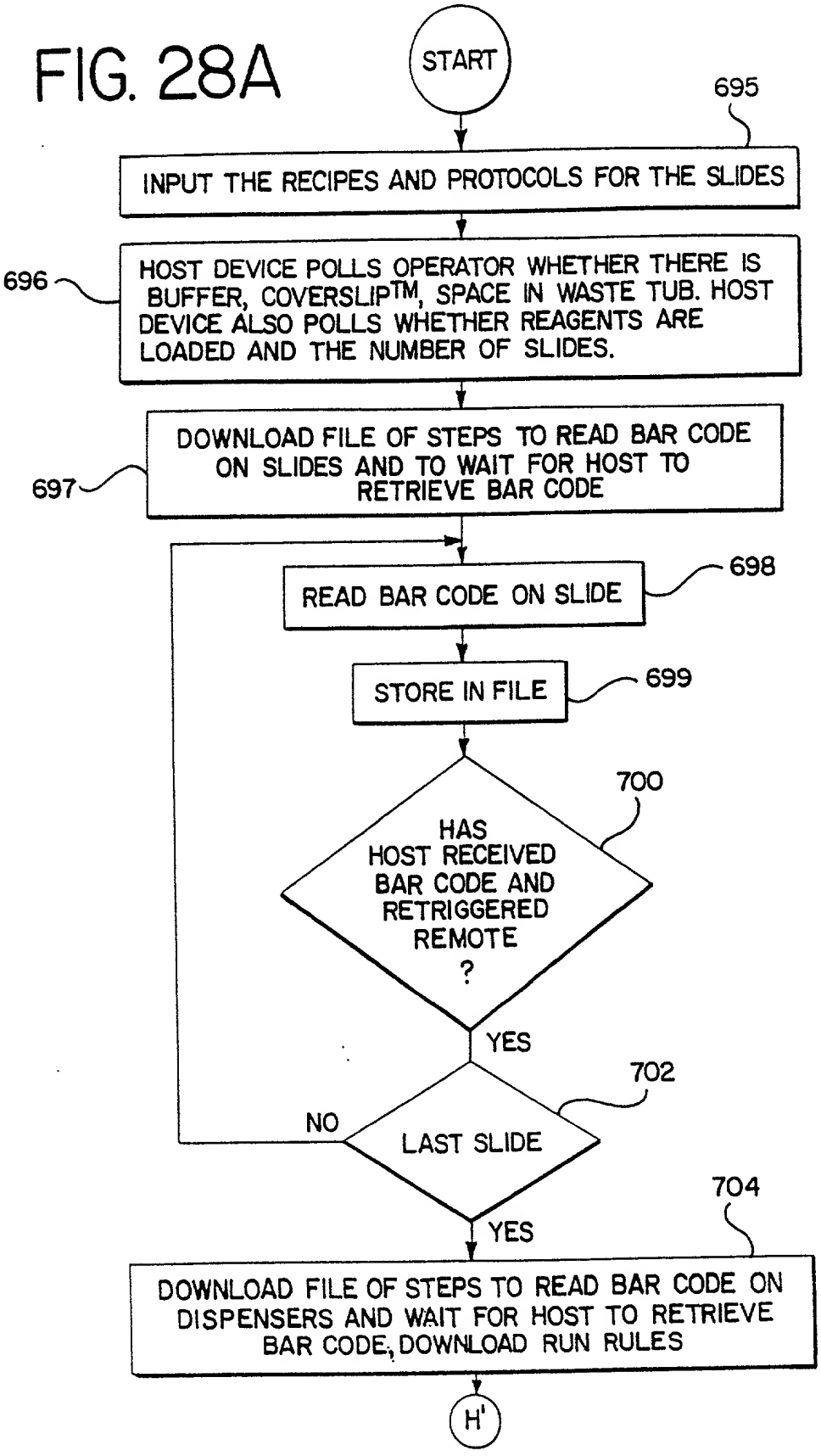

START
695
INPUT THE RECIPES AND PROTOCOLS FOR THE SLIDES
696
HOST DEVICE POLLS OPERATOR WHETHER THERE IS BUFFER, COVERSLIP™, SPACE IN WASTE TUB. HOST DEVICE ALSO POLLS WHETHER REAGENTS ARE LOADED AND THE NUMBER OF SLIDES.
697
DOWNLOAD FILE OF STEPS TO READ BAR CODE ON SLIDES AND TO WAIT FOR HOST TO RETRIEVE BAR CODE
698
READ BAR CODE ON SLIDE
699
STORE IN FILE
700
HAS HOST RECEIVED BAR CODE AND RETRIGGERED REMOTE ?
YES
NO
702
LAST SLIDE
YES
704
DOWNLOAD FILE OF STEPS TO READ BAR CODE ON DISPENSERS AND WAIT FOR HOST TO RETRIEVE BAR CODE, DOWNLOAD RUN RULES
H'

FIG. 28B

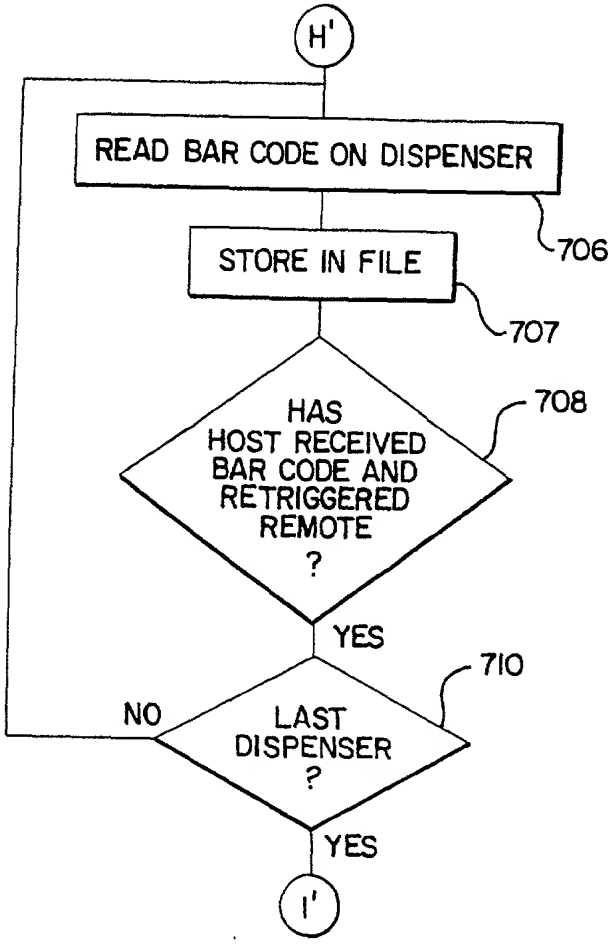

H'
READ BAR CODE ON DISPENSER
706
STORE IN FILE
707
HAS HOST RECEIVED BAR CODE AND RETRIGGERED REMOTE ?
708
YES
NO
LAST DISPENSER ?
710
YES
I'

FIG. 28C

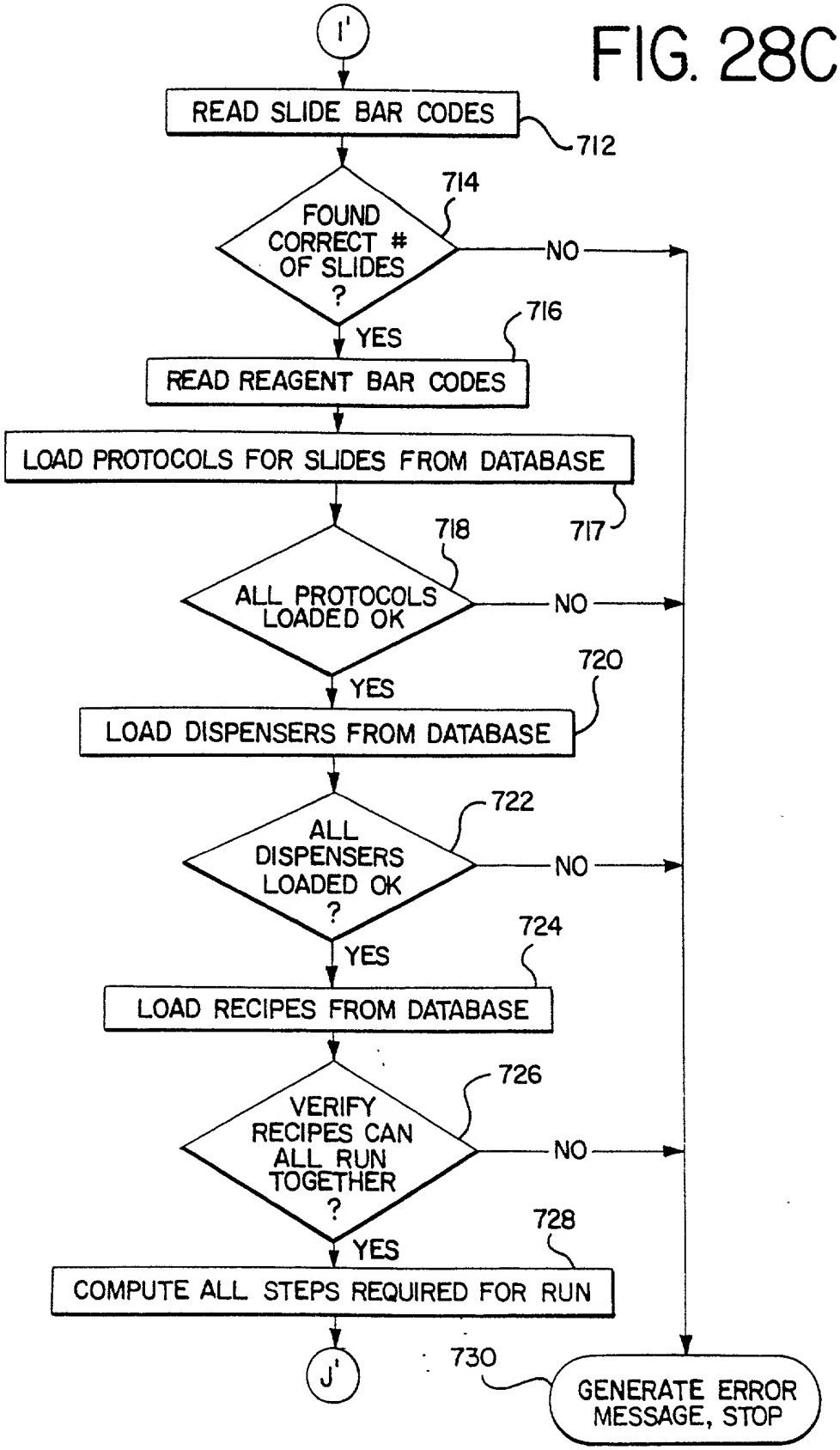

I'
READ SLIDE BAR CODES
712
714
FOUND CORRECT # OF SLIDES ?
NO
YES
716
READ REAGENT BAR CODES
LOAD PROTOCOLS FOR SLIDES FROM DATABASE
717
718
ALL PROTOCOLS LOADED OK
NO
YES
720
LOAD DISPENSERS FROM DATABASE
722
ALL DISPENSERS LOADED OK ?
NO
YES
724
LOAD RECIPES FROM DATABASE
726
VERIFY RECIPES CAN ALL RUN TOGETHER ?
NO
YES
728
COMPUTE ALL STEPS REQUIRED FOR RUN
J'
730
GENERATE ERROR MESSAGE, STOP

FIG. 28D

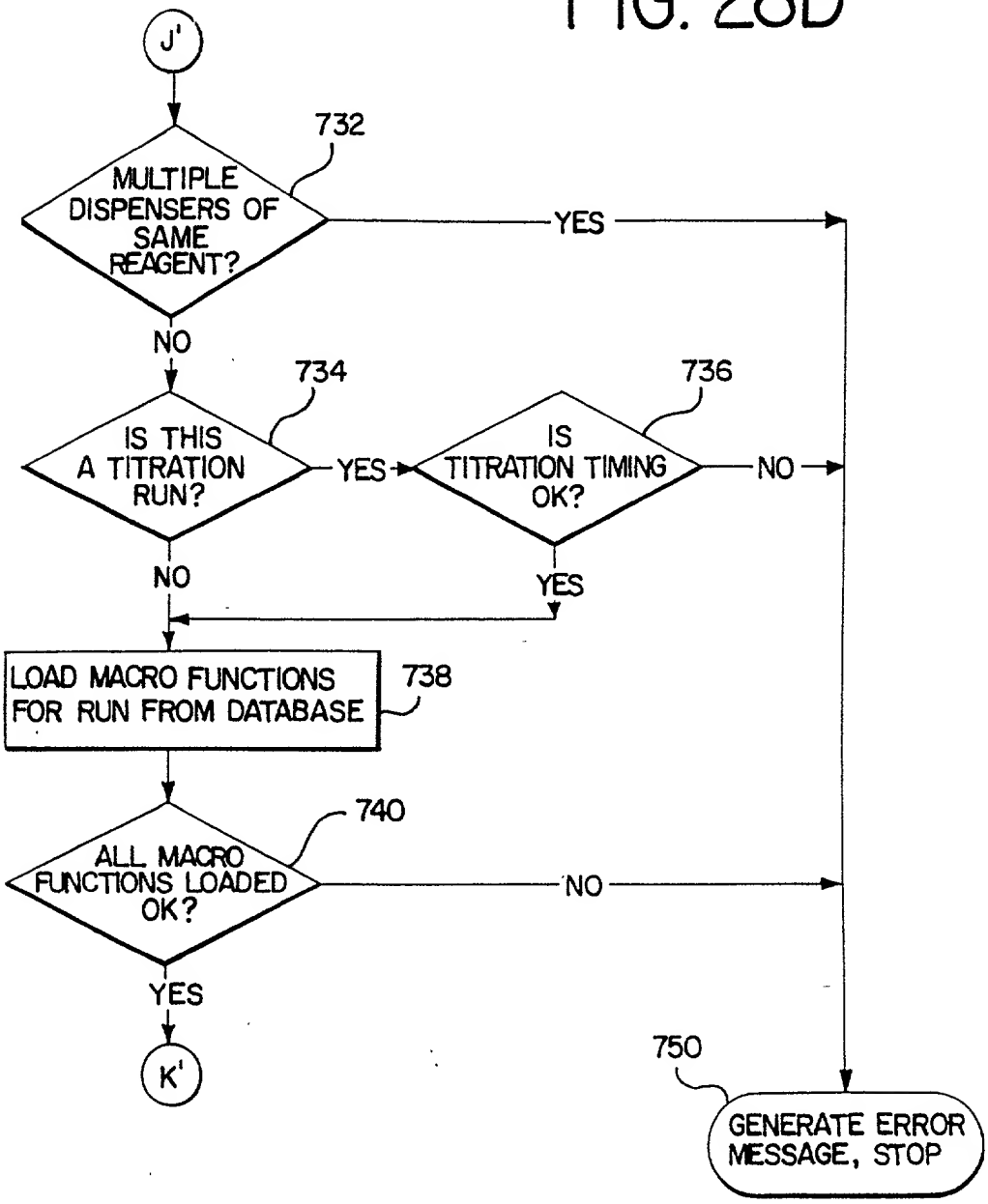

J'
732
MULTIPLE DISPENSERS OF SAME REAGENT?
YES
NO
734
IS THIS A TITRATION RUN?
YES
736
IS TITRATION TIMING OK?
NO
YES
NO
LOAD MACRO FUNCTIONS FOR RUN FROM DATABASE
738
740
ALL MACRO FUNCTIONS LOADED OK?
NO
YES
K'
750
GENERATE ERROR MESSAGE, STOP

FIG. 28E

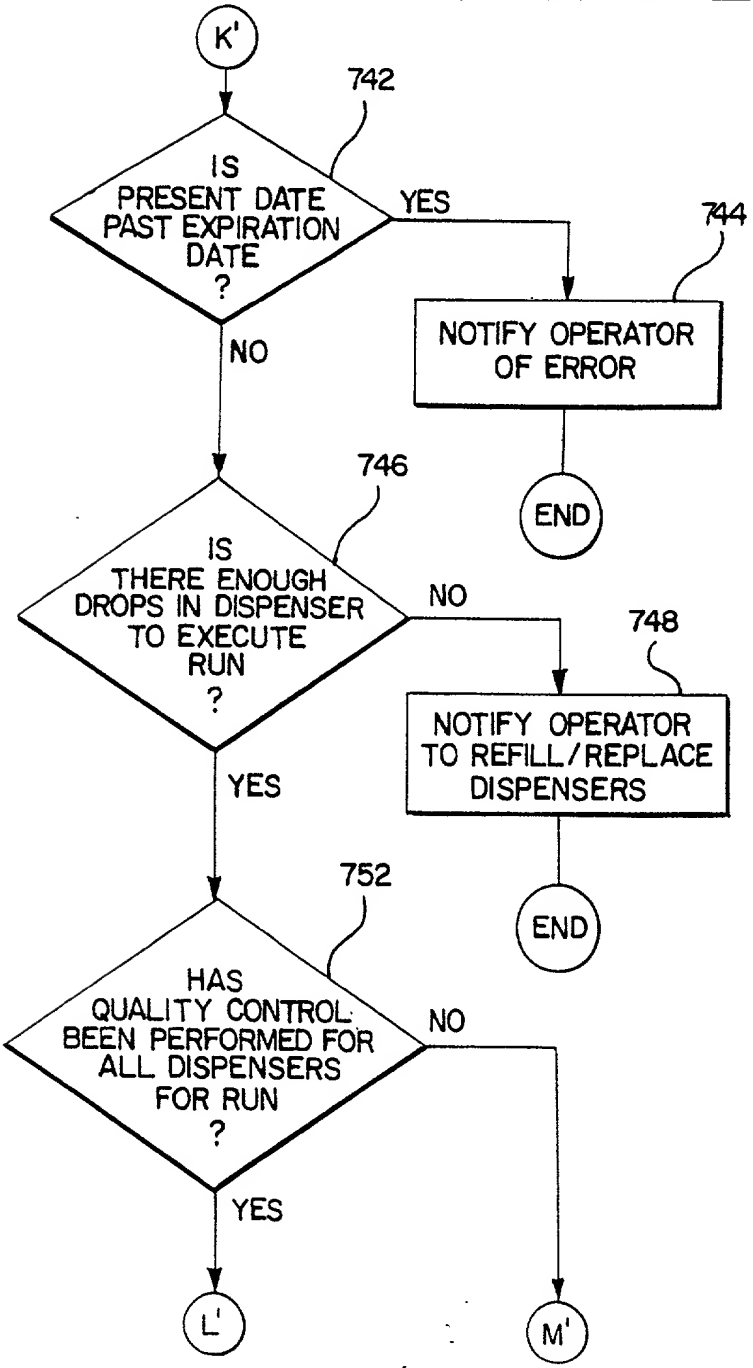

K'
742
IS PRESENT DATE PAST EXPIRATION DATE ?
YES
744
NOTIFY OPERATOR OF ERROR
END
NO
746
IS THERE ENOUGH DROPS IN DISPENSER TO EXECUTE RUN ?
NO
748
NOTIFY OPERATOR TO REFILL/REPLACE DISPENSERS
END
YES
752
HAS QUALITY CONTROL BEEN PERFORMED FOR ALL DISPENSERS FOR RUN ?
NO
YES
L'
M'

FIG. 28F

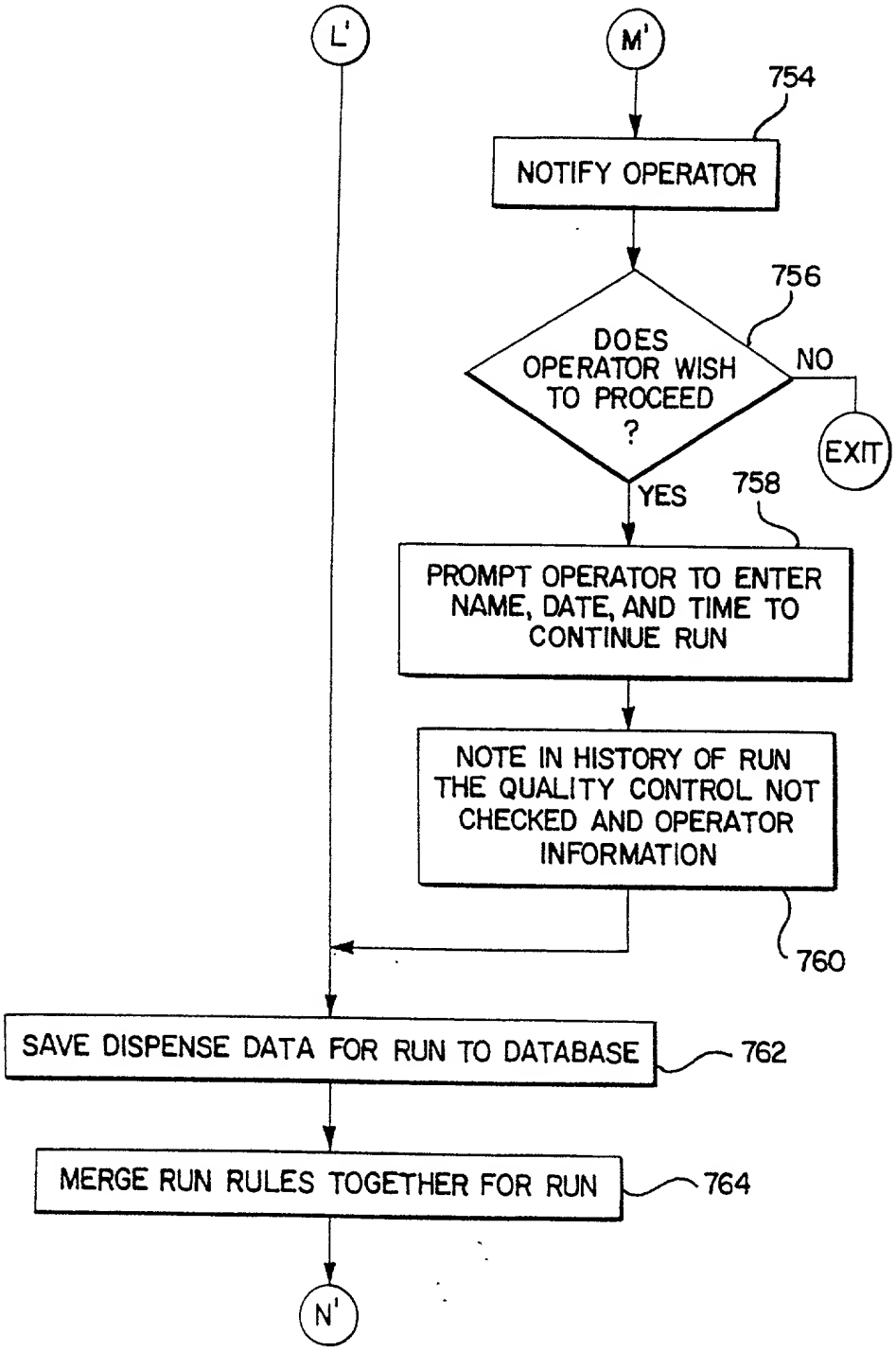

L'
M'
754
NOTIFY OPERATOR
756
DOES OPERATOR WISH TO PROCEED ?
NO
EXIT
YES
758
PROMPT OPERATOR TO ENTER NAME, DATE, AND TIME TO CONTINUE RUN
NOTE IN HISTORY OF RUN THE QUALITY CONTROL NOT CHECKED AND OPERATOR INFORMATION
760
SAVE DISPENSE DATA FOR RUN TO DATABASE
762
MERGE RUN RULES TOGETHER FOR RUN
764
N'

FIG. 28G

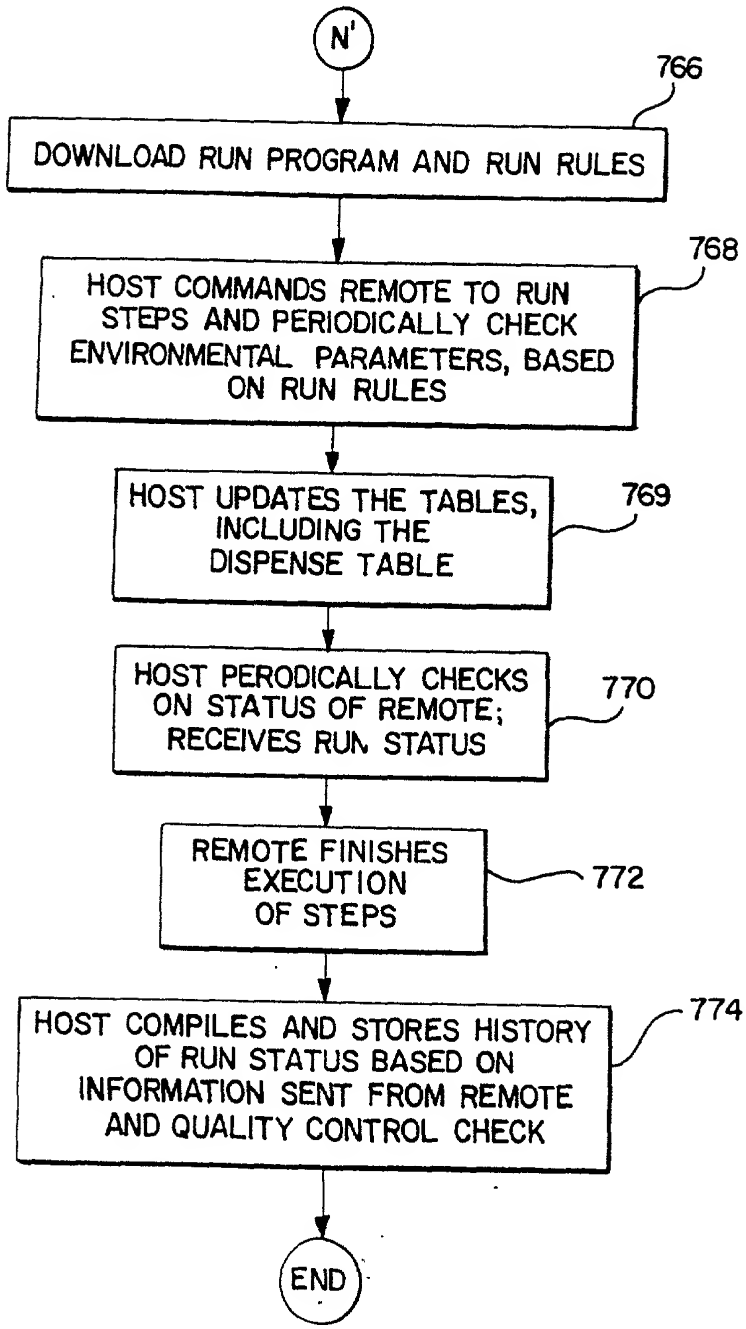
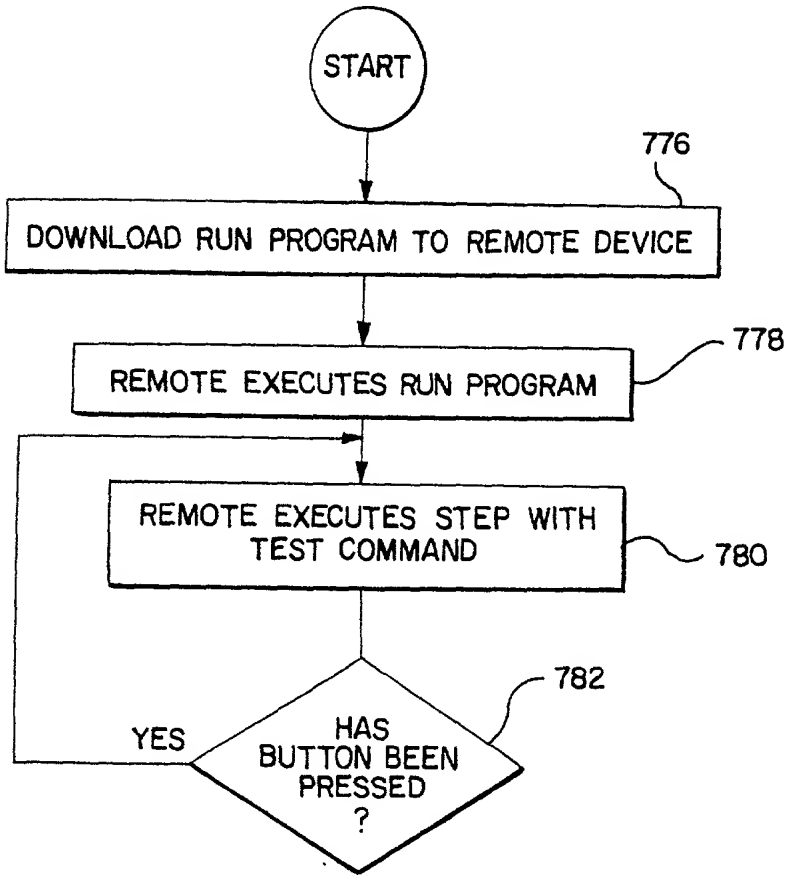

N'
766
DOWNLOAD RUN PROGRAM AND RUN RULES
768
HOST COMMANDS REMOTE TO RUN STEPS AND PERIODICALLY CHECK ENVIRONMENTAL PARAMETERS, BASED ON RUN RULES
769
HOST UPDATES THE TABLES, INCLUDING THE DISPENSE TABLE
770
HOST PERODICALLY CHECKS ON STATUS OF REMOTE; RECEIVES RUN STATUS
772
REMOTE FINISHES EXECUTION OF STEPS
774
HOST COMPILES AND STORES HISTORY OF RUN STATUS BASED ON INFORMATION SENT FROM REMOTE AND QUALITY CONTROL CHECK
END

FIG. 29


START
776
DOWNLOAD RUN PROGRAM TO REMOTE DEVICE
778
REMOTE EXECUTES RUN PROGRAM
REMOTE EXECUTES STEP WITH TEST COMMAND
780
782
YES
HAS BUTTON BEEN PRESSED ?